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486 Group Plans To Battle Vendor 'Lawlessness'

BY ALICE LAPLANTE

NEW YORK — A posse of powerful PC professionals will ride into Comdex to fight against what they see as standards "lawlessness" in the industry.

Called the 486 Standards Committee, this user coalition was formed under the auspices of the New York-based Microcomputer Managers Association and is open to any corporate PC buyer who influences the purchase of more than \$1 million annually.

The first public meeting will be held at Comdex on November 15 at 4:45 p.m. in Room M2-4 of the Las Vegas Convention Hall.

EISA Vendors to Implement Proprietary Memory Buses

BY ROBERT SNOWDON JONES

Industry players committed to the Extended Industry Standard Architecture (EISA) bus — most notably Compaq Computer Corp. and AST Research Inc. — say they plan to implement proprietary memory buses in their EISA machines.

The move should make it possible for EISA machine vendors to make performance improvements, but it undermines the market for standardized EISA memory expansion boards and may threaten price competition for those add-ons, warned

NEW THIS WEEK

With this issue, *InfoWorld* introduces Perspectives, a weekly section designed to explore issues of significance to our readers. The section will include a combination of feature-length articles and analysis and opinion pieces — all designed to put new trends, important issues, and key product categories into focus.

Also new this issue is the Impressions section, in which *InfoWorld* staff will discuss new and unreleased products.



"The 486 generation of PCs is only a year away, and we need to discourage manufacturers from coming up with proprietary hardware specifications in order to create what they consider an edge in the marketplace," said Brian Livingston, chairman of the committee.

As samples of Intel's 80486 chip begin to ship to selected vendors and design engineers, PC professionals are increasingly concerned that standards and compatibility will be ignored in the frantic race to provide more features and more innovative technology, Livingston said.

See 486, Page 85

OS/2 1.1 Meets Shipping Deadline

Publishers to Demonstrate Products Using Presentation Manager

BY RACHEL PARKER AND ED SCANNELL

NEW YORK — Defying skeptics who predicted Presentation Manager would be late, IBM and Microsoft today will announce that OS/2 1.1 with the graphical interface is shipping.

Since Presentation Manager was announced 18 months ago, industry observers have suspected that IBM and Microsoft would not be able to meet their planned ship date of October for the product.

Speaking last week at the Seybold Executive Forum, in Cambridge, Massachusetts, IBM senior vice president and general manager George H. Conrades said the graphical user interface for OS/2 will ship on time.

A wide variety of software publishers are expected to demonstrate their products at IBM and Microsoft's today's event here, including Aldus, Ashton-Tate, Lotus, Micrografix, Micromin, and Software Publishing.

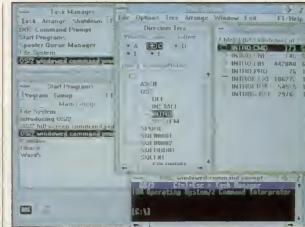
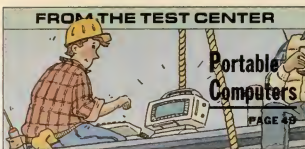
FIRST LOOK

Presentation Manager Offers Surprises

BY MICHAEL J. MILLER

Microsoft and IBM have some surprises for users with the OS/2 Presentation Manager, scheduled to be released today. Not only is the operating environment out on schedule, but the end-user version includes extras like computer-based training, a nice help system, and some unique innovations in its file manager.

Although it won't reach its potential until we start seeing



Presentation Manager offers a tree-structure file system, and OS/2 applications can be run within windows on the main screen.

PRESENTATION MANAGER PRODUCTS. A few publishers also are expected to demonstrate Presentation Manager products.

For example, Xcellent Inc. of Atlanta will show a graphics-

based system that uses Presentation Manager to streamline wide area network management.

Session support is handled through a card-stack metaphor

See PM, Page 85

Presentation Manager-specific applications, I've been using a prerelease version of OS/2 1.1 that Microsoft says is essentially identical to the shipping version, and I've found it to be rather nice. With its multiple windows, pull-down menus, file manager, and internal help system, this environment is an improvement over the interfaces in Microsoft Windows and the DOS 4.0 shell, and it goes well beyond the Program Selector of the character-based OS/2 1.0.

When you boot with OS/2 1.1, you see a graphics-based interface, controlled by two main windows. The Task Manager lists active programs and lets you switch among them. A Start Programs window lists all the applications you have installed and lets you access the DOS command line or the OS/2 command line, either full screen or within a window. Additional OS/2 programs can be installed in particular groups, so you

See Look, Page 85

AT DEADLINE

Some OS/2 Applications Delayed

IBM senior vice president and general manager George H. Conrades announced last week that IBM had sharply modified its expectations for the availability of OS/2 applications.

Although IBM had previously promised 1,000 OS/2 applications by the end of 1988, Conrades now maintains there will only be 600 such applications by the end of the year. In addition, Conrades said that most of those 600 OS/2-compatible applications will be DOS applications

running on OS/2's "compatibility box."

Conrades also planned, as other senior IBM executives have done recently, that OS/2 hasn't "taken off" as planned, but he added that all major software developers are writing "SAA applications" — IBM's term for applications written for OS/2 Extended Edition — that will be out by the middle of 1989.

— Ed Scannell
Continued on Page 3

IBM displays are getting attached to DEC, Data General and Prime computers.

The fact is, IBM® 3151 ASCII displays are getting attached to all kinds of multi-user systems.

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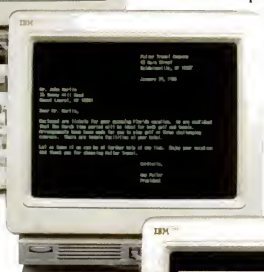
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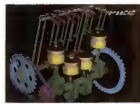


Model 310/360



Model 410/460

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Versacorp's Designer 5.4 now handles larger 3-D models directly.....17



IDD's Dreams program incorporates object-oriented shape tools.....33



Aldus Corp. founder Paul Brainerd is confident that the company is growing.....36

AT DEADLINE *Continued From Page 1*

Hayes Offers Multiple-Copy Licenses

Hayes Microcomputer Products Inc. announced a multiple-copy licensing program that permits customers to make as many as 1,000 copies of its Smartcom products for distribution to any location. Multiple-copy packages allow users to make 10, 100, 500, or 1,000 copies of either Smartcom II, Smartcom II/IBM, or Smartcom II for the Macintosh. Users can purchase additional documentation or make their own copies. A 10-copy package of Smartcom II — which retails at \$249 a copy — is \$1,690; a 1,000-copy package is priced at \$99,000.

— Robert Snowdon Jones

NEWS

Comdex will be larger than ever, but nothing revolutionary is expected.....8

Ashton-Tate's delivery of Dbase IV, Version 1.0 was immediately confronted with reports of incompatibility problems.....8

Although many PC vendors have slashed system prices in the last six months, many of these cuts have not reached PC buyers.....8

Lotus is being sued by a shareholder who claims the company disseminated "false and misleading information" about the delivery date of 1-2-3, Release 3.0.....8

Xerox will introduce Formbase at Comdex, a Windows-based WYSIWYG forms designer.....8

Mac Workstation will support Mac Irma card.....8

IBM has announced 49 new products to be made available to Big Blue's Higher Education Software Consortium.....8

NETWORKING

Ungermann-Bass announced its LAN Manager-based OS/2 network operating system which includes TCP/IP protocols.....11

SOFTWARE

Versacorp's updated PC CAD system includes EMS support and new 3-D drawing features.....17

HARDWARE

Hewlett-Packard unveiled its LaserJet IID which has the capability to print on both sides of a sheet of paper.....23

MACINTOSH NEWS

Avatar Corp. has added DFT support to its Mac Mainframe II communications products.....33

UNIX NEWS

Bain Inc.'s new Unix systems include symmetric multiprocessing.....38

INDUSTRY

William P. Lyons has been named to head Ashton-Tate's new PC applications division.....36

PERSPECTIVES

Perspectives debut: workgroup computing.....39

PRODUCT COMPARISON

In this comparison, we evaluate four 386 and four 286 portables.....49

IMPRESSIONS

New section: First impressions of Private Eye, PC Yellow Pages, Prompt, and Avery overhead transparencies.....64

REVIEWS

Compaq 386/20e.....66

Tandon Pac 286 Plus.....68

Form Easy from Graphics Development.....69

Microsoft Mach 20.....70

COLUMNS

Connections: David Burger.....18

Tech Talk: Steve Gibson.....31

State of the Industry: Rachel Parker.....37

Tech Street: John Gantz.....38

To the Editor.....44

Resources.....44

Riding the Fourth Wave: Jeff Angus.....48

A User's View: Jerry Pournelle.....48

First Look/System Source: Michael J. Miller.....62

Notes From the Field: Robert X. Cringely.....68

INFOMARKET

.....72

Adobe Acquires Trueform Developer

Adobe Systems acquired Spectrum Digital Systems of Madison, Wisconsin, which created Trueform, a Macintosh forms processing application. Although details of the acquisition were not revealed, Spectrum will be integrated into Adobe Systems, which will keep five of its six employees, according to Mitch Stein, Spectrum's president, who will become Adobe's engineering manager in charge of forms products.

Adobe said it plans to make "major revisions" to Trueform next year.

— Nick Arnett

Apple Developer Tools Sold Direct

Apple Computer Inc. will start selling its developer tools and programming languages directly to commercial and corporate developers rather than through the independent Apple Programmers and Developers Association (APDA), according to an official of the group. In essence, Apple will absorb the Reston, Washington-based nonprofit company, according to Frank Catalano, public relations manager for APDA and the A.P.P.L.E. Co-op. APDA has distributed Apple Computer's more than 100 developer products since August 1986 and, combined with the A.P.P.L.E. co-op, last year had \$6 million in sales.

— Laurie Flynn

Sony Set to Announce Workstations

Sony will unveil today a new series of workstations, designed around the Motorola 68030 processor and available with a new magnetooptical erasable optical disc drive. The News workstations are the 1700, 1800, and 1900 series. The 1700 is a 4.3-MIPS single-CPU machine, available in February and priced from \$13,900. The 1800- and 1900-series workstations, available now, are 5.3-MIPS dual-CPU machines that use 25-MHz processors. The 1800 series starts at \$31,900, while the 1900 series, intended primarily as file servers, starts at \$54,900.

— Martin Marshall

Quarterdeck Updates Four Products

Quarterdeck Office Systems began shipping last week new versions of four of its products.

Desqview 2.2 uses less conventional memory than earlier versions and costs \$129.95, with \$24.95 updates for Desqview 2.0 users and \$60 upgrades for Desqview 1.x users. The program is also compatible with Lotus Signal 2.1, a stock management package from Lotus Development Corp.

QEMM-386 lets users load system drivers into the 80386 high-memory areas, freeing conventional DOS memory. This \$59.95 update (\$19.95 for current users) can also emulate EMS memory and supports use of the 80386's virtual 8086 mode.

The \$189 Desqview 386 combines QEMM-386 and Desqview 2.2, enabling text and graphics programs to run in windows as well as supporting multiple 386 protected-mode programs with DOS programs.

QEMM-50/60, for the IBM PS/2 Models 50 and 60, now supports IBM XMA and compatible boards and retails for \$59.95, with \$19.95 updates.

— Mark Brownstein



This week's product comparison looks at 286- and 386-based portable computers.....49



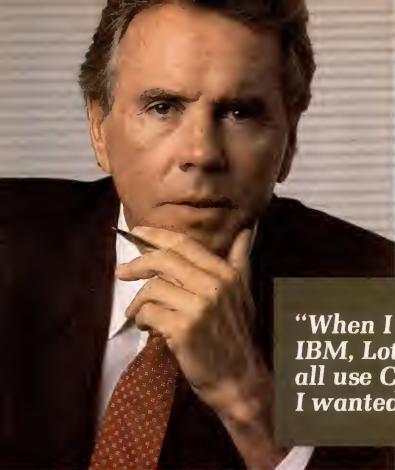
Reflection Technology's Private Eye offers light-weight and near-Hercules resolution.....64



Compaq 386/20e can handle up to 16 megabytes of 32-bit RAM without using a slot.....68

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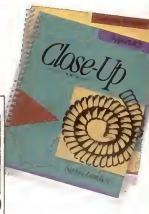
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NEWS

Several Innovations Won't Make Comdex

Improvements and Upgrades Will Abound

BY RACHEL PARKER

In a year characterized by promises of a revolution in computing, fall Comdex attendees are likely to see few products that reflect that revolution on the show floor.

That's the conclusion of dealers and consultants preparing for fall Comdex, which opens November 14. Although the show will be even larger than last year's record-breaking show, vendors are not ready to show many of the products that have captured headlines this year, including the Next machine, Micro Channel clones, and "next-generation" OS/2 applications.

"We will see a lot of stuff, but not anything revolutionary," said Seymour Merrin, president of Merrin Resources. "There will be lots of upgrades and odds and ends," he added.

The time for revolutions is gone," said Enzo Torressi, vice chairman of Businessland. "There may be some revolutions when the power of these platforms comes together with operating systems, but that is some time late next year."

Perhaps the most revolutionary announcement for the year — Steve Jobs' Next computer — will not be seen on the show floor. Although the company exhibited at the Educom conference last week, it has not reserved booth space for the more dealer-oriented Comdex.

Other hardware vendors are working on improvements to their current AT and 80386 systems, as well as supporting the 80386 SX chip.

"We're going to see a plethora of 80386 SX machines," said Larry Fortmuller, director of systems marketing at AST Re-

search. "I expect an awful lot of companies will be looking at [the 386 SX] as a bridge between AT and the 80386 systems."

And although the technical issues have been addressed, most observers doubt that many hardware vendors will announce Micro Channel compatibles.

"There may be some Micro Channel clones, but not in significant numbers," said Alan Hald, chairman of Micro Age Computer Stores. Like many other dealers, Micro Age franchisees see no demand for Micro Channel compatibles, he added.

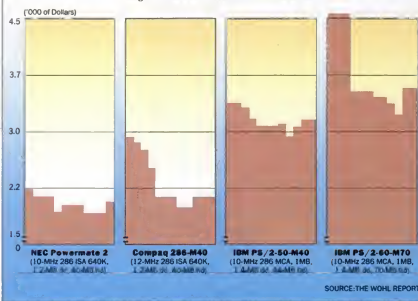
The Gang of Nine vendors will also disappoint anyone looking for a glimpse of future Comdex. With the Extended Industry Standard Architecture (EISA) specification nearing completion in October, vendors are not able to even show prototypes of EISA-based systems.

Still, the Gang of Nine — and especially Compaq — will likely discuss EISA systems and how they will differ from existing 80386-based systems. "Compaq and the Gang of Nine need to position where these machines will fit," said David Carmona, a PC analyst with Infocore. They also need to reaffirm their on-going commitment to AT-bus systems for individual users, he said.

Software vendors are also trying to straddle a fence by continuing to support and enhance existing packages while making strong commitments to OS/2. While IBM and Microsoft will host an OS/2 forum at the show, most vendors and observers doubt the OS/2 applications shown at fall Comdex will take full advantage of the new operating system or prompt users to switch to the new system.

Street Prices of 286 Machines

Range of Prices from October 1987 to October 1988



The fluctuating costs of key components, including DRAM chips, have kept PC prices high.

Some PC Price Cuts Fail to Reach Users

BY ALICE LAPLANTE

Over the last six months, many leading PC vendors have slashed system prices, but analysts point out that these price cuts have often not been reflected in the actual price end-users pay.

This has been a year heavy with price fluctuations as well as rumors of price decreases that haven't panned out. And while there is plenty of evidence to support the prevailing wisdom that price/performance in the PC industry continue to rise steadily, there is also evidence to prove that wisdom false.

Research by World Associates of Bala Cynwyd, Pennsylvania, which tracks "street prices" of PC hardware, shows that after a dramatic drop in street prices in

the closing months of 1987, prices still remained on a plateau but then increased slightly. The Whoil Report compares similarly configured systems, so that any change in system configuration is taken into account.

Reasons for this are varied, analysts say. For one, the fluctuating cost of key components has made it difficult for vendors to keep prices low. "I've talked to a number of vendors who say they absorbed most of the added expense of the DRAM, and they can only go so far in doing that," said JoAnne Stahel, vice president of research at Storeboard Inc., in Dallas.

But a less obvious reason, which explains why vendors' lower retail prices while street prices remain stable or even increase, is dealers — who have been discounting PCs as much as 30 to 40 percent — simply hold prices even when retail prices drop.

A number of manufacturers announced price cuts on 80286-based machines in recent months. Compaq attacked the issue in late June. When it announced several new machines, it also cut the retail price of its Deskpro 286 by 15 percent.

In late June both NCR and Hewlett-Packard followed suit by announcing price cuts on 286 and 386 machines by as much as 18 percent. And in August, Wang started offering its key corporate accounts fully loaded 386 systems for under \$4,000, a 60 percent off retail prices.

But a look at the Whoil index of actual end-user street prices shows that leading 286s (from

Epson, AST, NEC, Compaq, and IBM) have all increased in the past three months. And in the 386 arena, most street prices have remained flat over the past seven months, with IBM offerings dramatically increasing in end-user cost.

But Apple shocked the industry most with its mid-September skyrocket price increases, ranging from 14 to 30 percent. The list price of the base Mac II rose from \$3,769 to \$4,869.

IBM has sent very mixed signals about its pricing strategy. In February, IBM's Bill Lowe announced IBM would be offering increased price/performance across its entire PS/2 line.

But when price cuts did finally arrive, they were moderate. In the June 6 introduction of the Model 70 and improved Model 50, IBM offered only slim discounts on certain PS/2s, with the original Models 30 and 50 not discounted at all.

In the form of the enhanced Model 30 built around a 286 processor and retailing for under \$2,000, which was announced in mid-September, Lowe's statements were partially confirmed. However, his prediction that its customers would be able to buy (at the end of 1988) 286 systems at the same price as the current 8086-based Model 30 has yet to be fulfilled.

There is evidence of future price increases, and from unlikely sources. For example, Key Tronic Corp., which provides keyboards for many OEMs, last week announced price hikes of 8 to 15 percent — the first such increase in its history.

Dbase IV Ships but Is Incompatible With Some Programs

BY MARK BROWNSTEIN
AND PEGGY WATT

Ashton-Tate, saying it is hoping for a last-minute surge in quarterly revenues, hustled out the first copy of Dbase IV Version 1.0 last week and met with complaints that the product is incompatible with some earlier applications.

Applications that are developed under Dbase III Plus and earlier are at a disadvantage with the vendor's compiler, or that otherwise do not strictly follow Dbase III Plus conventions, may not run when automatically recompiled under Dbase IV, according to an Ashton-Tate spokesman.

The Dbase III Plus interpreter ignores some code flows, but the code probably fails under Dbase IV's new "automatic compiler," which is actually a tokenizer since it does not produce executable code, the spokesman said. However, Dbase III Plus source code will run unmodified with Dbase IV.

First reports of the problem came from the United Kingdom, where Dbase IV shipments expired a week, the *Business World*, a sister publication of *InfoWorld*, reported Dbase III Plus applications from Computercraft Ltd. of London crashed under Dbase IV.

Ashton-Tate said it plans to

have 150,000 copies shipped by today, though some distributors say they don't expect them to be on the shelves until November 10. First shipped are upgrade kits for current users, who have waited since the product's announcement in February.

Ashton-Tate is shipping the \$795 standard Dbase IV, the \$1,295 Dbase IV Developer's Edition, and the \$995 Dbase IV Laser Pack, which adds five nodes.

Several distributors said that after the product was delayed three times, Ashton-Tate is so eager to ship the product this quarter that some shipments are arriving by overnight courier.

IBM Refrains From Backing HP's SAA-Compliant Interface

By Bob Ponting

In an unusual twist, IBM said last week it doesn't plan to support the SAA-compliant user interface for Unix that Hewlett-Packard is expected to unveil this week at the Uniform show.

The interface, which is dubbed the Common X Interface (CXI), was developed by HP and Microsoft and will provide HP's Unix systems with the look and feel of the Presentation Manager, said Nicholas Fowler, HP's marketing manager

for user interfaces. CXI will run on top of the X Window windowing manager and uses the X Window API (Applications Programmers Interface), he said.

However, IBM, SAA's developer, has decided against endorsing the interface at this time. "We will not take Presentation Manager and force it on Unix customers just because we think it's wonderful and SAA portability would be nice," said Dan Cerutti, IBM's AIX product manager. "If OSF goes with Open Look or something else, we don't want to be left out in the

cold," he said.

Until the industry settles on a standard interface, IBM will offer two options — Nextstep from Steve Jobs' Next Inc. and whatever interface OSF decides to use, Cerutti said.

In the meantime, HP and Microsoft will be pushing for CXI's acceptance as the OSF standard. CXI is part of a phased strategy for porting the Presentation Manager user interface and applications programmers interface from OS/2 to Unix, said HP's Fowler. A common user

interface would hide differences between the two systems from users.

CXI provides Unix with only the look and feel of Presentation Manager, Fowler said. While CXI is functionally identical to Presentation Manager, it will look somewhat different from the OS/2 version. HP has added perspective and shadow to buttons, windows, menus and scroll bars, giving the screen a three-dimensional look, he said.

The interface will be available to OEMs, VARs, and developers in three pieces, Fowler said. HP and Microsoft have jointly developed a Presentation Manager style guide for writing applications. A CXI programmer's toolkit, developed by HP, provides a library of routines for creating and manipulating objects like scroll bars, buttons, and menus. A Window Manager, developed with the toolkit, manages the screen's real estate, files, and icons, he said.

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Lotus Slapped With Class Action Lawsuit Over 1-2-3 Holdups

By Ed Scannell

BOSTON — A class action lawsuit was filed last week against Lotus Development Corp., claiming that the company purposely misled stockholders about when it would deliver Lotus 1-2-3, Release 3.0.

The suit, filed in federal district court here, charges the company, president Jim Manzi, and board member Alexander d'Arbeloff with disseminating "false and misleading information," regarding delivery of Release 3.0. (d'Arbeloff is also the president of Teradyne.)

The suit also charges the defendants' statements tried to soften the adverse impact on company revenues of the two shipment delays. The company's stock price has dropped from 33 in March to 17½ last Thursday.

The suit asserts that several Lotus executives, including Manzi, sold stock in February when the stock was close to its peak, a few weeks before the company announced the first delay of Release 3.0. Manzi sold 250,000 shares priced between \$27.50 and \$28 on February 22. Manzi has said he sold the stock to pay income taxes.

The suit is brought by shareholder Matthew Berliner on behalf of all those who purchased Lotus stock between February 25 and October 7. So far, however, no other plaintiffs have been named. Berliner claims that he lost \$3,000 because of Lotus' misleading statements.

"Our view is that the claims are entirely without merit and we will vigorously defend ourselves," said Henry Gutman, an attorney with the New York-based law firm of O'Sullivan, Grac and Karabell, which is defending the company.

Lotus had a similar suit filed against it in mid-1985 when a shareholder claimed that Lotus wasn't being forthright about sales of Jazz and technical problems with Symphony. Lotus won that suit when the judge ruled the complaint was not representative of the class named in the suit.

No date has yet been set for preliminary hearings.



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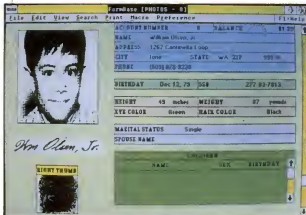
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Formbase is a Windows-based forms designer that lets users create color forms with drawing tools, multiple fonts, and graphics.

Xerox to Show Integrated Form Designer at Comdex

BY BOB PONTING

For the newest entry in its desktop software portfolio, Xerox will introduce an integrated forms processor and database manager at fall Comdex.

The new product, Formbase, is a Microsoft Windows-based WYSIWYG forms designer intended to complement Xerox's Ventura Publisher desktop publishing package and the Xerox Presents graphics package.

Users design a form. Formbase automatically creates and manages the database underneath it, said Frank Mahdavi, president of Columbia Software of Northridge, California, developer of the product.

As users interface to the database, so users can set mailing lists, inventory control, and other applications without programming. Users can also

define field computations and data-entry validation.

Windows graphics tools are used to design forms and data-entry screens. Users can modify a form and its underlying database at any time, Mahdavi said. To link fields among forms, users cut and paste parts of one form into another.

Formbase can directly import ASCII data and files from several common applications and imports graphics through the Windows clipboard. The program includes a text editor that can be used for mail-merge applications and a script facility to automate repetitive tasks.

Xerox has all marketing rights for Formbase and plans to ship the product in the first quarter, bundling with the Windows run-time system and Bitstream Fontware. Prices will be announced at shipping time.

EISA

Continued From Page 1

buses to increase performance on their high-end machines, say EISA will ease, but not solve, the memory management problem. Instead of using EISA as a memory and I/O bus in the tradition of the standard architecture, they will continue to develop proprietary memory bus architectures. Their competitors are expected to follow suit.

FLEX MEMORY. Compaq said it will continue to develop its Flex memory architecture along with adopting the EISA bus because future CPUs won't get optimum memory performance from the EISA bus alone.

"One of the things that will not be stable in the future is the processor technology that's developed," said Gary Stinac, Compaq's vice president of systems engineering. "We believe we'll have 20- to 50-MHz chips all requiring different memory architecture. The transfer rate of

the 80486 will go up by two or more times what it is now. We would want to tie it down to the I/O bus."

WITHERING DEMAND. Board makers are already preparing for a withering in demand for stand-alone memory boards. Instead of memory boards, the companies will concentrate on making intelligent peripherals that contain their own memory and operate independently from the CPU.

"If we don't see plain add-in memory cards as a real big opportunity on the EISA bus," said Tim Cutler, director of product marketing for Quadram Corp. "Eventually you'll see [CPU memory] disappear from the I/O bus alone."

It is likely the EISA bus will be relegated to the chores of input and output for disk drive, modem, LAN connections, printers, and graphics — tasks it will be able to handle with ease.

PLUS-IN DRAM SIMM. Expanding memory on these high-performance computers will be differ-

Colby to Sell SE Model of Walk-Mac

Plans for Authorized Apple Dealers to Install Spare Motherboards

BY LAURIE FLYNN

FRESNO, CA — Taking an innovative approach to the Mac portable market, Colby Systems Corp. plans to sell unfinished SE compatibles to authorized dealers who will then complete construction of the systems by installing spare Mac SE motherboards into them.

In December, the company will begin selling the Walk-Mac SE, which weighs only 12 pounds and uses a form factor that includes a built-in keyboard and internal battery option. To configure the units, dealers will draw from their own stock of Mac SE motherboards, generally used for servicing their customers, according to company president Charles Colby.

The Walk-Mac SE's screen is a double supertwist blue backlight LCD, and its keyboard includes a numeric pad and function

keys. The list price of the Walk-Mac SE is \$5,499.

Options include the Epsom Smartcard, a credit-card-size static-RAM card with an optional battery. In January, Colby will offer an optional flat-panel display that users can attach to oversized projectors.

The Walk-Mac SE, which resembles a standard DOS laptop in design and measures 12 inches by 15 inches by 3½ inches, will replace all of Colby's earlier portable models, which will be discontinued.

Colby is one of two vendors selling a portable Macintosh. Dynamac of Golden, Colorado, announced in August an SE version of its Dynamac portable Mac.

When its dealer approach, which Colby had used several years ago before deciding to sell direct, the business of constructing a portable based on legal

Mac ROMs is made easier, Colby said. Currently, to create a Mac portable, a manufacturer must buy fully constructed Macs and disassemble them for the motherboard.

Colby will also sell fully equipped models of the Walk-Mac SE to corporate customers who don't have a store of Mac SE motherboards.



The 12-pound Walk-Mac SE has a built-in keyboard and an optional internal battery.

IBM Enhances Its Academic Offerings

BY ALICE LAPLANT

One week after Steve Jobs and Next jumped into the higher education market, IBM has announced a slew of grants, software discounts, hardware donations, and academic fellowships to further ingratiate itself with the academic community.

IBM announced 49 new projects to be added to its list of system software and applications that will be made available to members of Big Blue's Higher Education Software Consor-

tium. In addition to an existing list of workstation and midrange software, the 49 new programs include computer-aided engineering applications as well as business applications such as forecasting, accounts receivable, and sales analysis.

The consortium is open to accredited nonprofit institutions of higher education; there is a one-time fee based on the number of faculty and students. Consortium members acquire access to a broad range of leading-edge system and application software for advanced-function workstations and mid-range computers.

Microsoft also announced an extensive new education program covering every level of the education market, from grade school through universities. Part of the program includes an agreement with IBM to bundle IBM software with PS/2 machines. Until further notice, IBM will include a copy of Microsoft Windows and Microsoft Works with every Model 25 with a hard drive sold to eligible faculty, staff, and students.

In addition, for selected institutions, Microsoft Windows, Microsoft Word, and Microsoft Excel will be included with each Model 50 Z or Model 70.

Mac Workstation to Use Mac Irma Emulation Card

BY LAURIE FLYNN

ANAHEIM, CA — Apple Computer Inc.'s Mac Workstation program will soon support DCA's Mac Irma 3270 emulation card, according to an Apple official.

DCA will offer software that will enable its Mac-to-mainframe card to work with Mac Workstation, and Apple will include code written by DCA in its program, according to Peter Hirschberg, Apple's manager of host systems integration. Mac Workstation allows programmers and corporate developers to more easily create Mac-like front ends to mainframe host applications.

DCA will make the announcement this week at the Macintosh Business Conference & Exposition here.

Mac Workstation's support for Mac Irma is not an exclusive arrangement, and Apple Computer hopes to broaden the base of supported platforms, according to Hirschberg. "It's our intent to support a lot of people that way," said Hirschberg. "We'd love to see a Mac Workstation link to a range of environments."

The price of Mac Workstation will not be affected by the addition of support for Mac Irma, said Hirschberg.

DCA official said the company will announce 3270 software this week but declined to give specifics.

Avatar Corp. of Hopkinton, Massachusetts, announced in August a programmer's toolkit that added support for Mac Workstation to their Mac Mainframe 3270 product.

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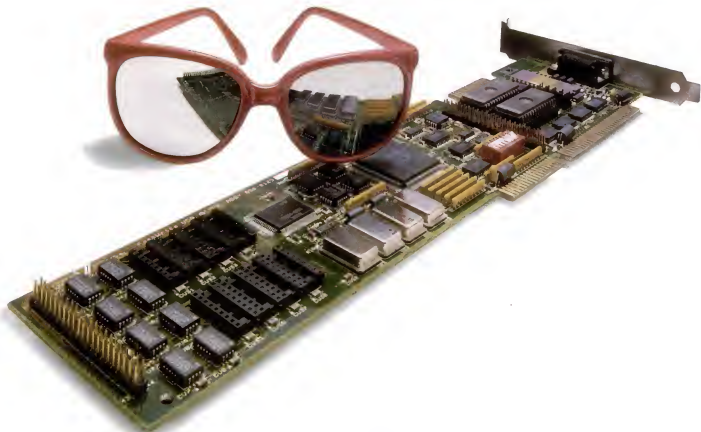


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NETWORKING

UBI Announces Its LAN Manager OS

Program Supports DOS Redirector, TCP/IP Protocols, MCA Board

By SHARON FISHER

Ungermann-Bass Inc. officially announced last week its LAN Manager-based OS/2 network operating system, which supports TCP/IP protocols and the new DOS redirector, as well as an intelligent Micro Channel Architecture communications board.

Like other LAN Manager-based programs, such as 3Com's 3+Open, Net/One MS OS/2 LAN Manager lets users combine DOS and OS/2 workstations on a LAN under an OS/2 server. The value that UBI adds to the LAN Manager includes support for Transmission Control Protocol/Internet Protocol (TCP/IP), support for TCP/IP applications such as Telnet, and a simple asynchronous emulator that allows users to connect to corporate systems, said Georganne Benesch, the company's product line manager.

Ungermann-Bass also said it was the first company to support the NetWare 2.0 DOS Redirector, which provides a number of OS/2 features — including support for the named-pipe interface — to DOS workstations when connected to an OS/2 server running LAN Manager.

FUTURE ENHANCEMENTS. Possible future enhancements include support for network printers, support for network manage-

ment, and the capability to connect several networks, Benesch said.

The software also includes drivers for UBI's communications boards, the company said. Users of UBI boards that don't buy UBI's product will be able to obtain the drivers from a Microsoft bulletin board, according to Steve Kanzer, product manager for Microsoft's network business unit, because UBI has granted Microsoft permission to distribute the drivers. Not all the LAN Manager OEMs may grant Microsoft this permission, he added.

Kanzer also said that Microsoft doesn't intend to "police" its OEMs' products to guarantee interoperability, saying it was the vendors' responsibility to work together. However, because of specifications such as Netbios over TCP/IP and Microsoft's MAC-layer interface, users are likely to find at least core-level interoperability.

The company also announced the NIUPs, an MCA card that supports either Ethernet or Token Ring LANs, as well as Irma- and IBM-compatible 3278 emulations for micro-mainframe communication.

The board includes 512K of RAM that is expandable to 1 megabyte and an Intel 80186-compatible coprocessor that offloads some work from the PC, improving performance. A remote network boot capability

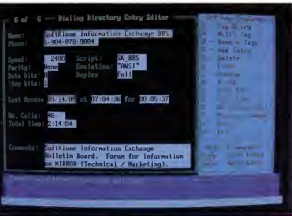
allows users to install the card in diskless workstations, which then boot from the server.

EISA VERSION. An Extended Industry Standard Architecture (EISA) version isn't under development, according to Michael Gardner, UBI's vice president of sales and marketing. "We don't have an EISA development effort underway," he said. On the other hand, should UBI receive sufficient user demand, the company would be able to respond quickly, he said.

Net/One MS OS/2 LAN Manager is available in two versions: one that allows an unlimited number of users per server, and the Net/One MS OS/2 LAN Manager Entry Level System, which supports up to five concurrent connections. The products cost \$2,995 per server and \$995 per server, respectively. Both versions will be available in limited release next month, with general availability in December.

The Enhanced version of the NIUPs card is available now, while the Token Ring version will be available in limited quantities in December and generally available in January, Benesch said. Both boards cost \$1,895 with 512K; prices for the 1-megabyte version are not yet set.

Ungermann-Bass Inc., 3900 Freedom Circle, Santa Clara, CA 95054; (408) 496-0111.



Sofikone's Mirror III has a point-and-shoot dialing directory that lists parameters for calling up other computers and bulletin boards.

Enhanced Version of Mirror To Offer 2 User Interfaces

By ROBERT SHOWDOWN JONES

Sofikone Distributing Corp. recently announced that Mirror III, an enhanced version of its Mirror II telecommunications software, will offer two user interfaces, its own script language, and a file-compression protocol that more than doubles transfer rates.

Although Sofikone made a name for itself when it was sued for cloning DCA/Crossstalk Communications' Crosstalk XVI, it chose not to copy the next-generation Crosstalk MK 4 package, said Keith A. Ackerman, Sofikone's director of marketing. "We talked to a lot of MK 4 users, and they were unhappy with the interface," he said.

As a result, Mirror III has a menu-driven interface modeled after Crosstalk XVI, as well as a point-and-shoot dialing directory that lists parameters and other necessary information. Sofikone also developed its own script language, named Prism (Programmable Integrated Scripts for Mirror), which is upwardly compatible with Mirror II's and Crosstalk XVI's script languages. Prism is an add-in module that permits users to program complex automated sessions. One of the language's strongest features, Ackerman said, is its capability to run scripts in the background and access data to a foreground application.

"It can import data directly from Dow Jones to a spreadsheet," Ackerman said. The spreadsheet script has been written and may be included with the software when it ships the second week of November. If not, it will be available on the company's electronic bulletin board.

Other Mirror III features include ACT Compressor, a file compression and link-level

error-control protocol that can improve file-transfer speeds between two Mirror systems an average of 2.5 times.

Other new features include support for Compuserve-B and windowed Kermit file-transfer protocols, VT-220 and Wyse-50 terminal emulation, and a chat mode.

The software will cost \$99.95. Upgrades for current Mirror users will be \$29.95 until January, and \$39.95 after that, Ackerman said.

Sofikone Distributing Corp., 327 Office Plaza Drive, Tallahassee, FL 32301; (904) 878-8564.

DEC Announces PC LAN/Server, Ashton-Tate Pact

By ED SCANNELL

ETON, MA — Digital Equipment Corp. formally announced last week its PC LAN/Server 2000, a turnkey file server for networks running between eight and 30 MS-DOS-compatible machines.

DEC also announced an agreement with Ashton-Tate Corp. that will see Ashton-Tate developing and DEC marketing and supporting various versions of Dbase for DEC's line of VAX minicomputers.

The PC LAN/Server 2000 package is centered around DEC's Microvax 2000 running under the VMS, Version 5 operating system. The package is layered with the company's VAX/VMS Services for MS-DOS, DEC-Net end-node software, 16 DECNet client licenses, integrated local and wide area PC Mail, and a PC LAN/Server Install shell and administrative interface.

32-BIT CAPABILITY. "It is the only LAN based on 32-bit software,"

said John Rose, manager of DEC's personal computing systems group.

Under this suite of software, the Microvax 2000 is configured with 4 megabytes of RAM, a 159-megabyte hard disk with an expansion interface, a 95-megabyte streaming tape drive, and an Ethernet controller.

Besides supporting MS-DOS files, the new package also supports printers attached to it, a terminal server, a VAX/VMS server, and a VAX system or VAX-cluster system located anywhere in a DEC-Net LAN or wide area network.

Besides MS-DOS, the PC LAN/Server 2000 supports several industry standards, including IEEE 802.3 Ethernet, MS-Net, Netbios, and the ISO's Open Systems Interconnect model.

PC LAN ALTERNATIVE. DEC officials contend the package is an attractive price/performance alternative to competitors selling PC LANs. They claim that benchmarks conducted by DEC

show that their package configured for 15 users is 30 percent faster than a similar system from Novell Inc.

Priced at \$18,800, the PC LAN/Server 2000 is available immediately. The price does not include a VT-220 terminal that administers the server.

The agreement between DEC and Ashton-Tate will result in Dbase being offered for use on multiuser computers for the first time. DEC said that the agreement is part of its stated strategy to offer best-selling applications across its desktop hardware platforms and line of VAX minicomputers.

The agreement calls for the development of a characterized Dbase for VAX users with VT terminals and graphics-based versions for DEC-Windows workstation users.

These programs will run under both VAX/VMS and Ultrix operating systems and offer local and remote transparent data access and sharing with DEC's VAX RDB/VMS or native Dbase databases.

A PC-to-VAX database link is included in the agreement that allows Dbase applications running on networks PCs to access data in remote Rdb/VMS databases.

GLOBAL NETWORK. "Customers have been telling us they are running Dbase on islands of information that they need to integrate these isolated users into a global network," said Henry Anconda, vice president of DEC's Business and Office Information Systems Group.

All existing applications written under Dbase III Plus and Dbase IV will be compatible with Dbase products under both VAX/VMS and Ultrix.

The Dbase/SQL language, along with DEC's Network Applications Support services, forms the platform on which developers will build applications for any desktop device, according to Ed Esteb, Ashton-Tate's chairman.

Both DEC and Ashton-Tate declined to say when these products would be available.



Datamedia's Netmate PC/Workstation is based on a 20-MHz 80386 microprocessor. A diskless version is also available.

Workstations Support LANs, DEC Systems

BY ED SCANNELL

NASHUA, NH — Datamedia Corp. has introduced a family of network-oriented workstations that supports most of the best-selling LANs and specifically focuses on connections to Digital Equipment Corp. systems.

The purpose of the Netmate PC/Workstation line, which is based on the 20-MHz 80386 processor, is to combine enterprise-wide communications and host-systems with low-cost microcomputers, according to the company.

Datamedia officials said it has done this by integrating key software and hardware components into the Netmate line, thereby saving users from having to do the same.

For instance, VGA-quality graphics, VT-241 terminal emulation, VT-340 graphics, a DEC or IBM keyboard, and DOS-compatible applications are all basic Netmate features and capabilities. The systems also have IBM AT-compatible slots and external SCSI bus expansion, which give users a number of options, a spokesman said.

Datamedia will target the line at markets with workstation applications, such as securities, currency and commodities trading,

desktop publishing, software engineering, electrical and mechanical CAD/CAE, and telecommunications.

The series is offered in two configurations: diskless and with disks. The diskless Netmate contains Netcard, a credit card-size storage device for remote start-up over a LAN. Information is accessed from and stored on a networked server system's mass storage devices.

The Netmate systems with a disk include the 386/20-01, which has a 1.44-megabyte 3½-inch disk drive, and the Model 386/20-08, which has an 80-megabyte 3½-inch hard disk and a 1.44-megabyte 3½-inch disk drive. A 40-megabyte 3½-inch hard disk can be added to the 386/20-01 as an upgrade option.

The Netmate systems include a full selection of networking software such as DEC's PCSA, Novell's Netware, Sun Microsystems' NFS, 3Com's 3+, and IBM's PC LAN. Available in 30 days, the diskless 386/20-00 costs \$4,895, while the disk-only 386/20-01 is priced at \$5,195, and the disk-only 386/20-08 is priced at \$6,995.

Datamedia Corp., 11 Trafalgar Square, Nashua, NH 03063; (603) 886-1570.

Software Links Network, LAN Manager

Interlan Product Offers Interoperability Between Operating Systems

BY MARK STEPHENS

Network users who are tempted by Microsoft's OS/2 LAN Manager may be interested in software from Interlan Inc. that allows Network clients using standard Network commands to transparently access LAN Manager servers.

Interlan's LMN Server software runs on all versions of LAN Manager, emulating Network services including log in, directory access rights, active connection information, and print spooling, according to product manager George Jones. The product supports MAC drivers written to the Microsoft Network Driver Interface specification.

LMN Server requires a Network server on the network, as well as a LAN Manager server, and does not allow administration of the Network through the LAN Manager. "Administrators can log directly on to the Network server for those functions," Jones said.

"As a company that is both a LAN Manager licensee and a Novell OEM, we saw the need to provide interoperability between these dominant network operating systems," Jones said, adding that running LMN Server between LAN Manager and the Network client imposed no more than a 5 percent performance penalty.

A similar Interlan product will allow Network servers to operate on LAN Manager networks, Jones said.

"We expect that both Novell and Microsoft will welcome this product, since interoperability inevitably opens sales opportunities," Jones said.

From Novell's perspective, "welcome" may be too strong a word. "The concept of clients being able to talk with different servers is reasonable," he says.

"We've thought of doing our own product allowing LAN Server clients to access Network servers — but this product doesn't appear to go far enough," said Mark Calkins, vice president of marketing for the Novell Software Group.

"A good migration path gives

you everything you already have and more, which this solution does not appear to do," Calkins said. "It doesn't appear to offer a multivendor applications capability, and it doesn't appear that other network services, such as a comm server [dedicated network server], can be recognized. And it isn't a complete solution if only Network clients are served."

The LMN Server mainly will appeal to companies that are already running multiple operating systems and are looking

for some level of interoperability, Calkins said.

"We're not naive," Calkins said. "We know companies are looking for LAN Manager. But this is not a likely migration path. It just doesn't present a very good picture of the LAN Manager server."

LMN Server is scheduled to ship late in the first quarter of 1989 for \$850 per server, according to Interlan.

Interlan Inc., 155 Swanson Road, Buxton, MA 01719; (508) 263-9929.

SDI LAN Gateway Software Can Use IBM Token Ring

BY ROBERT SHOWDOWN JONES

Software Dynamics Inc. of Florida announced Version 1.2 of its SDI 3274 LAN Gateway for OS/2, as well as the availability of its IBM 3780 Remote Job Entry (RJE) emulation software for OS/2.

The SDI 3274 emulates the functions of IBM's 3174/3274 SNA/SDLC communications controller with attached terminals and printers, said Ted Hamlin, Software Dynamics' president. The program can be used with a single PC or with a LAN.

The new version has the capability to use IBM Token Ring as the gateway attached to the mainframe, Hamlin said. The gateway can connect to a 3174 controller or 3274 series end equipped for Token Ring operation. The Token Ring permits higher speed operations and a higher number of logical units on the gateway than a connection through coax.

The software currently supports Novell and 3Com's LAN Manager. IBM LAN Server support will be provided when that product is released, Hamlin said.

A single unit of SDI 3274 software is priced at \$345 with discounts for 200 or more units. SDI 3274 LU software costs

\$100 each. An SDI MPCC adapter costs \$320 for the PC AT bus and \$330 for the IBM PS/2 (SDI MPCC/2). Quantity discounts apply to these products as well. An example system consisting of software, one MPCC/2 adapter, and 32 LUs would cost about \$3,210. LU components are available now.

The RJE emulation software for OS/2, called SDI 3780, runs on both PC AT and MCA computers, the company said. The software emulates all functions of the IBM 3780 RJE terminal except for Home mode and On-line test mode. On-line printing can be directed to PC printers, to disk files, or piped to other processes.

Data-link control can be point-to-point or multipoint with EBCDIC or ASCII line-control codes. Line speeds are typically 9,600 bps.

SDI 3780 has other features such as security identification, disk-resident log files, and a special PC-to-PC mode for transferring file files. A diagnostic loop function tests the hardware adapter and local mode, the company said.

It is priced at \$699 and is available now. Software Dynamics Inc. of Florida, P.O. Box 247, Dunedin, FL 34697; (813) 733-8784.

Network General Introduces Broadband Sniffer Protocol Analyzers

BY MARK STEPHENS

Network General Corp. has rediscovered broadband networks, introducing new versions of its 6000 product line for analyzing Sysk, Inc.'s 2-mbps Localnet 6000 LANs, as well as IBM's 1-mbps PC Network.

The broadband Sniffers will be sold by both Network General and Sysk, the companies said.

"We've had to forgo some

bits, because we didn't have [protocol analysis] capability," said Kishore Tarachand, senior product line manager at Sysk. "So we looked for the best product available, and it was Network General."

Sysk, a company that specializes in large networks, has an installed base of more than 2,000 networks, representing more than 440,000 nodes running protocols including DECnet, DLC, TCP/IP, Netware,

and Vines, said Tarachand.

The broadband Sniffers were developed using Sysk's 6120 and 6130 intelligent network adapter cards and Sysk software, according to Network General's president Harry Saperstein.

"This is a rigorous application for an adapter board," he said. "We are asking the board to capture all the traffic on the network, and we require intelligent boards, so much of the code executes on the board rather

than in the computer. The Sysk boards are very well-engineered."

The broadband Sniffers are available in both laptop and portable versions, with one model supporting the original IBM PC Network frequencies and the other supporting Sysk's Localnet 6000, according to Network General. Prices range from \$13,750 for the 300 Series Sniffer to \$24,000 for the portable 386-based 500 Series.

All versions will be available in November.

Additional broadband Sniffers are likely to follow, supporting Ungermann-Bass and Bridge (now 3Com) protocols, said Saperstein. "MAY is a further possibility. That we do not yet consider it a proven product," he said.

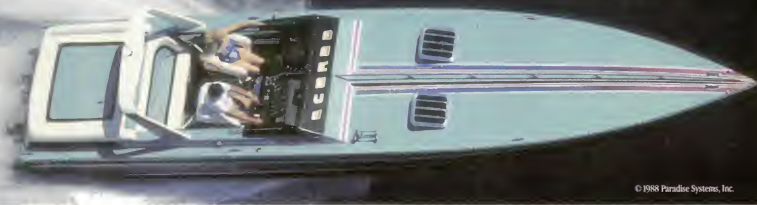
Network General Corp., 1945A Charleston Road, Mountain View, CA 94043; (415) 965-1800.

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Communications Products Due From Omnitel at Comdex

BY SHARON FISHER

Omnitel Inc. plans to introduce at Comdex a number of modems, gateways, and other communications products.

The company said it will announce internal and external full-duplex 9,600-bps modems that support the V.32 protocol standard. Features include full-back operation to 4,800 bps and support for V.22 bis, V.22, Bell 212A, and Bell 103 protocols. The modems will cost \$995. Support for Microcom Networking Protocol (MNP) Class 5 is available as an option, the company added.

Giving users the capability to share modems on a LAN, Omnitel will also introduce two asynchronous gateways, the company said.

An entry-level gateway includes two internal 2,400-bps modems, gateway software, and Bitcom/LAN workstation communications software. The gateway costs \$995 and is available in a PS/2 version as well.

A high-speed gateway includes two 9,600-bps modems, gateway software, and four V-Com serial communications redirector cards for the workstations, which enable standard asynchronous serial communications software to be used with the gateway, the company said. The gateway costs \$2,995.

Omnitel will also bring out a PS/2 version of its V-Com card, a four-port serial communications card, an expanded line of internal and external cellular phone modems, and enhancements to the company's Asynchronous Communications Server gateway software. The enhancements include support for the PS/2 and serial card support, the company said.

Omnitel Inc., 3500 W. Warren Ave., Fremont, CA 94538; (415) 490-2202.

UDS Enters ISDN Market With Stand-Alone Adapter

Universal Data Systems Inc. entered into the budding Integrated Systems Digital Network (ISDN) marketplace with a stand-alone terminal adapter for basic-rate interface service.

The UDS TA100 adapter provides two B channels operating at 64,000 bps and one D channel running at 16,000 bps. It permits PCs and terminals to transmit between 300 to 19,200 bps asynchronously and 2,400 bps to 64,000 bps using synchronous transmission. Up to five telephone extensions can be connected

to the TA100 adapter, according to the company.

The TA100 is designed to link with ISDN service that uses the Northern Telecom DMS 100 digital central office switch. Both devices use the standard LAPD protocol in the D signaling channel and the T-Link data rate adaptation protocol in the B data channels, the company said.

Although the company is known for its wide line of analog modems, said George Grumbles, UDS president, "we

recognize the tremendous benefits of the all-digital network, and we expect to be a major player within that market."

Two other major modem makers, Hayes Microcomputer Products Inc. and Microcom Inc., offer ISDN adapters on a limited basis.

The TA100 will be shipped in volume in January for \$1,500.

Data Systems Inc., 5000 Bradford Drive, Huntsville, AL 35805; (205) 721-8000.

— Robert Snowden Jones

A few words
to anyone buying
networking software
like there's no
tomorrow.

Datability Announces Server to Connect 128 PCs to a Digital VAX

Datability Software Systems Inc. recently announced a device that allows up to 128 PCs to connect to a Digital Equipment Corp. VAX minicomputer.

The Vista Communications Server supports DEC's LAT protocol for communicating with the VAX, which means the device looks like a DEC Server on the network and can be controlled by standard DEC applications.

Users can switch to TCP/IP or OSI protocols by swapping a network interface card, Datability said. The card includes a 10-MHz Intel 80186 microprocessor and an Intel 82586 network coprocessor for improved performance.

The device has four slots, which each hold an eight-port or 32-port line card.

An eight-port Vista Communications Server — which includes a network interface card, chassis, and an eight-port line card — costs \$3,499. Additional eight-port line cards cost \$1,299 each, while a 32-port line card costs \$3,199, the company said. The product will begin shipping January 15.

Datability Software Systems Inc., 322 Eighth Ave., New York, NY 10001; (212) 807-7800.

— Sharon Fisher



CONNECTIONS ■ By DAVID BUERGER

The Choice of a File Server Can Be Critical to Your LAN

Choosing a LAN file server used to be easy. A new crop of hardware options now complicates this choice. The decision is important because the server can be the critical part in your LAN's performance.

The type of server you choose depends on the network's design. Peer-to-peer workgroup networks, like Apple's Local

talk and 10-Net Communications' 10-Net, do not require a dedicated server. The primary use is resource sharing. Shared data on these LANs are on local disks. This requires users to be aware of who has what—an impracticality in some work situations.

Centralized LANs keep shared data on one or more dedicated servers. The server also runs the network operating system and application software. In addition,

resource sharing funnels through the server. Vendors such as Banyan, 3Com, and Novell use the centralized approach in their LAN setups.

Such users obviously need a reliable server. If the server breaks, so does the LAN. Moreover, the server must be fast enough to keep up with demand. Most popular LANs give you three choices for a server: an 80286 AT, an 80386 AT, or a customized LAN server that uses either a

286 or 386. Customized servers include extra features such as tape backup units, uninterruptible power supplies, and additional I/O slots.

The first two choices become a LAN server with a network interface card (NIC) and a network operating system.

This approach is straightforward and inexpensive. Virtually any reliable AT clone can be a server.

But is it fast enough? The server's total speed is a factor of several things. It includes the CPU's microprocessor speed, I/O bus speed, NIC data throughput speed, network backbone transfer speed, hard disk access speed, amount of RAM, and disk or RAM caching techniques.

Equally relevant to server performance is the nature of what users do on the LAN. It makes little sense to spend four times the cost of a 286 AT server if your six-node LAN mainly runs E-Mail and printer sharing.

Network users who do transactional accounting, CAD, or other CPU and disk-intensive tasks should pay careful attention to selection of an adequate server. This is critical if only one server hosts such work for a large group of simultaneous users.

The 386 PC often is sold as a fast LAN server. Yet virtually none of the popular network operating systems can take advantage of this processor. Most 386 ATs use the same 16-bit bus for NICs as 286 ATs. This means the data transfer rate will be about the same.

Of more practical importance is the hard disk and its controller card. XT and AT hard disk controllers traditionally use ST 506/412 controllers. These transfer data at about 5 mbps and can run up to two large drives. The use of ESDI or SCSI controllers will boost transfer rates to between 10 and 15 mbps, as well as handle up to seven large drives.

Another way to speed 286 or 386 ATs is to add 2 or 3 megabytes of extended RAM. Most network operating systems effectively use this for caching. Dramatic speed improvements are the result.

So what kind of a network server should you buy? Clearly, the server you choose must match or exceed performance to match your application needs. For many, a fast 286 AT may be adequate as a network server.

According to a recent International Data Corp. (IDC) study, about 375,000 LAN operating systems will ship in 1988. IDC estimates that roughly 75,000 dedicated LAN servers will ship. Thus, four out of five LAN buyers are voting with their wallets for the cheaper solution.

Transforming a 286 or 386 into a LAN server is not a risky proposition. If you later determine that a customized server is more appropriate, you can always turn the AT into a regular node.

The limited appeal of customized servers probably reflects a lack of widely used applications that need this power. As this changes, so will the need for high-end LAN servers.

My next column will look at how customized servers can benefit high-end LAN applications.

David J. Buerger is executive editor of connectivity and testing at InfoWorld. E-Mail comments may be sent to: dbuerger@cup.portal.com or MCI Mail ID 304-0160; send the MCI 'Subject' line with #D2PDB/buerger/subject. The views expressed are his own.

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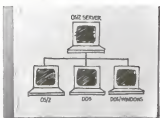
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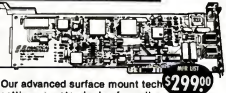


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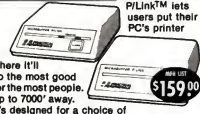
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SOFTWARE



Versacorp's updated Versacad Designer 5.4 now handles larger 3-D models directly, including extensions.

Versacad Designer 5.4 Offers 3-D Drawing, EMS

BY BOB PONTING

Versacorp is shipping a new version of its PC CAD system that supports extended memory and new 3-D drawing features.

Versacad Designer, Version 5.4, which will be shown at fall Comdex, draws on extended memory to handle larger 3-D models and speed processing, said Brian Cody, Versacorp product manager. Extended memory also speeds display refresh and pan and zoom, he said. The product now supports Lotus/Intel/Microsoft extended memory specification 4.0.

Previous versions could extrude 2-D objects into 3-D models, but Version 5.4 lets users create models by drawing 2-D objects in 3-D space, Cody said. Users can draw lines, polygons, arcs, rectangles, triangles, circles, polygons, and ellipses.

By moving the cursor in a 3-D perspective view or by specifying X, Y, and Z coordinates. The program also supports line trim and extension in 3-D space as well as construction using fillets and chamfers.

Versacad supports five kinds of dimensioning, ANSI standard and user-defined hatching patterns, and 12 new text fonts. The integrated macro programming language was also improved.

It runs on PC and PS/2 compatibles with 640K of RAM, a math coprocessor, hard disk, and graphics card. Versions for Sun Series 3, Apollo DN, and HP Series 9000 Unix workstations are under development as ship by the end of the year. Versacad costs \$2,995 on all platforms, with \$295 upgrades for users of Version 5.1 or later.

Versacorp Corp., 2124 Main St., Huntington Beach, CA 92648; (714) 960-7720.

Specwriter Supplies Tools For Writing Design Specs

BY STUART J. JOHNSTON

Specwriter, a design tool that provides tools to write program specifications as well as screen and report painting and prototyping, is now shipping from Accelerated Systems Inc.

The screen painting feature supports both PC and IBM 3270 screens, including pop-up screens, and can create screens up to 132 columns wide, the developer said. A user can prototype as many as 20 screens to emulate a finished system.

The report painter can define comprehensive reports of up to 300 columns wide, with multiple segments. Screens and report prototypes are dynamically

linked for automatic updates in case of change.

Specwriter comes with a full-function word processor with an Include function that can link screens and reports to documents. The product also has a record layout and development feature to define data records.

The package runs on DOS-based PC and PS/2 compatibles with 256K of RAM and a hard disk. It supports CGA, EGA, and VGA and more than 130 printers.

Specwriter costs \$345 and comes with a 30-day money-back guarantee and free phone support. Customers also can choose either a \$25 discount or free copy of the Accelerated

Text-and-Image Database Ships

BY PEGGY WATT

Precision Inc. is now shipping a relational database management system that also stores graphics files and comes with a word processor, forms generator, and communications capabilities.

Superbase 4, a GEM-based product, is an updated version of a product marketed in Europe for two years by Precision Software Ltd. of England, said Daniel Browning, president of the U.S. corporation.

The product uses Digital Research's graphical environment, including windows and mouse support, to provide WYSIWYG fill-in form design, show several pages simultaneously, and accept image fields.

Users can view data as a relational table, or form. They can build forms with data from several Superbase databases, or import it in common file formats and specify data types for fields. The relational database language is a superset of Basic for ease of programming with any key, including function keys. "It's our contention that data-

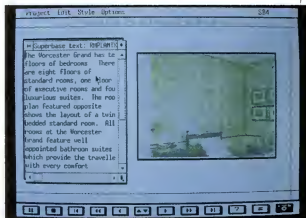
base manipulation doesn't have to be boring," Browning said.

Superbase 4's text editor accepts mail merge from the database. Its built-in telecommunications can automatically load or send files and call Superbase's on-line technical support network.

Superbase 4 costs \$695 and

includes a GEM run-time version. A version that runs under Microsoft Windows is scheduled for release in January, and Amiga and Atari ST versions are under development, Browning said.

Precision Inc., 8404 Sterling St., Suite A, Irving, TX 75063; (214) 929-4888.



The relational database Superbase 4 can accommodate text fields and image fields and show them in several forms.

Lotus' CD/Networker Creates One Source LAN Server

BY SCOTT MACE

A network version of Lotus Development Corp.'s One Source family of CD ROM products will be out in the first quarter of 1989, Lotus officials said.

CD/Networker will also be the first One Source implementation to attach multiple CD ROM drives to a PC. Stacking drives will give One Source library subscribers access to 8 to 10 gigabytes of data.

"The number of CD ROM drives you can attach to the CD/Networker server is a function of the number of open slots you have," said Tim McManus, marketing director for Lotus' Compact Disk Information Services Group. Each slot accommodates up to seven SCSI CD ROM drives, he said.

One Source users can integrate data with 1-2-3. Lotus updates One Source data weekly, monthly, quarterly, or overnight by modem, depending on

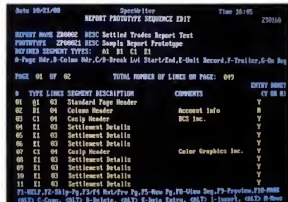
subscriptions. The One Source library, which includes banking, private company data, and international databases, is still expanding.

CD/Networker databases will be sold on an annual subscription basis in a turnkey system that includes a 386-class machine as the server, CD ROM drive software, and the CD ROMs. The CD/Networker database server functions similarly to a peripheral server to the network, McManus said. It communicates across the network directly with the nodes, independent of other network hardware, processing requests from network users to access the One Source CD ROMs. CD/Networker uses Netbios and is compatible with Novell Network, IBM Token Ring, Banyan Vines, and 3Com 3+ networks.

Individual subscriptions range from \$7,000 to \$20,000 per year; the average corporate customer spends \$30,000 on an initial single-user subscription.

Network pricing will be similar but will add per-node subscription charges and a per-server charge for the CD/Networker package itself. A 20-node installation of CD/Networker and CD/Corporate databases would add \$30,000 to a single-user subscription, for a \$60,000 total, including customer service and support.

Lotus Development Corp., 55 Cambridge Parkway, Cambridge, MA 02142; (617) 577-8500.



Specwriter lets users choose from a host of attributes to build a series of screens that emulate different systems.

Systems' \$75 Cobol record layout add-on. A range of code generators to work with the product are planned for future release.

Accelerated Systems Inc., 4951 Clairemont Square, Suite 298, San Diego, CA 92117; (800) 541-2071 outside CA; (619) 560-1414.

Sybase Announces Marketing, Product Development Pacts

BY SCOTT MACE

Sybase Inc. recently announced several alliances for product development and marketing, including interaction with a CASE product and a Unix-based 4GL.

Sybase said the company will help market a computer-aided software engineering (CASE) product from Interactive Development Environments (IDE) that complements the Sybase SQL Toolset. Sybase and Unify Corp. will also jointly market a combination of Unify's Accell

application generator as an interface to the Sybase SQL Server. The SQL Server is also the server technology used in the Microsoft/Ashton-Tate/Sybase SQL Server environment.

The CASE product, Software Through Pictures, provides CASE methods for users to analyze and design database systems. It includes a template that generates an SQL schema, the overall database design that defines an SQL database. The ease of creating SQL schema means the package can be quickly

moved from the CASE environment to operational database systems.

Both products are based on open architectures, provide a powerful set of integrated tools, and address the large class of applications for real-time, embedded systems, said Stewart Schuster, Sybase's vice president of marketing. IDE's CASE tools and the Sybase RDBMS both run on the DEC VAX and Sun platforms.

Unify will interface its Accell development environment to SQL Server, providing an integrated fourth-generation

language and application generator. A cooperative processing option offloads user processing from a Unix host to a DOS-based PC to let users mix applications written in Accell across PCs, terminals, and Windows systems. The first implementation will be on a Sun system.

Sybase Inc., 6475 Christie Ave., Emeryville, CA 94608; (415) 596-3500.

Unify Corp., 3870 Rosin Court, Sacramento, CA 95834; (916) 920-9092.

IDE, 595 Market St., 12th Floor, San Francisco, CA 94105; (415) 543-0900.

Cullinet Ships New Version of Its CASE IDMS/Architect Tool

Cullinet Software Inc. is shipping a new version of IDMS/Architect, a PC-based CASE tool that provides micro-to-mainframe communications facilities to upload designs to the company's IDMS/R database management system.

The release extends support for ADS/Online 4GL applications, enabling a substantial amount of development of ADS/Online applications on PCs.

Also added is the capability to download existing IDMS/R schemas to the PC where IDMS/Architect can be used to reverse-engineer and modify them.

IDMS/Architect runs on PC XT, AT, and PS/2 compatibles under DOS and requires a minimum of 640K of RAM and 17 megabytes of hard disk space.

A single-copy license for the standard version of IDMS/Architect costs \$8,000 and is \$12,000 with Architect Tools, which provides the micro-to-mainframe connectivity. Volume discounts and site licenses are also available.

Cullinet Software Inc., 400 Blue Hill Drive, Westwood, MA 02090; (617) 329-7700.

— Stuart J. Johnston

Migraph Ships Library Of Clip Art for Publishing Products Running GEM

Draw Art Professional, a library of object-oriented clip art for publishing products that run under Digital Research Inc.'s GEM, is shipping from Migraph Inc.

Because the illustrations are object-oriented rather than bit-mapped, they can be resized without losing any detail, Migraph said. The graphics also print at the highest level of resolution available from either a dot-matrix or laser printer.

The graphics are stored as GEM files and can be loaded into any application that uses that format, such as Ventura Publisher or GEM Draw Plus.

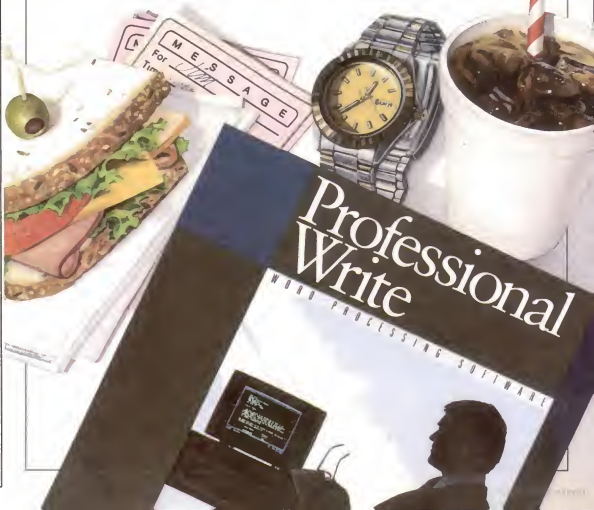
"There are over 14 categories of high-quality line art, including art tools, office, food, music, sports, and arrows," said Kevin Mitchell, Migraph's president. Migraph also plans to release several other graphics libraries.

Draw Art Professional costs \$69.95 and includes more than 150 illustrations. The package is available in either 3½- or 5¼-inch disk formats.

Migraph Inc., 200 S. 333 St., Suite 220, Federal Way, WA 98003; (206) 838-4677, (800) 223-3729 outside WA.

— Stuart J. Johnston

Today's managers
are expected to learn
word processing
in their spare time.



Beyond Word Writer Features 'Mimic Mode'

A new word processor that features a Lotus-like interface and mimics popular word processing programs began shipping recently from Timeworks.

Beyond Word Writer has pull-down menus with dialog boxes and a mimic mode to speed learning by accepting keystroke commands from other word processors, including Word Perfect 5.0, Microsoft Word 4.0, and Wordstar Professional 5.0.

Users can edit as many as three documents simultaneously, with full use

of cut, copy, and paste commands between the documents. It also allows access to DOS commands in a DOS window. Users can transfer files among the mimic-mode word processors.

The word processor also offers line and box drawing, international characters, and on-screen multiple columns that snake when edited. It includes other word tools such as a memory-resident thesaurus with more than 240,000 synonyms, a built-in proofreader, and a choice of four spelling checkers. The continuous on-line

spelling checker checks each word as it is typed. Also available are full-document and single-word spelling checkers, and a "Soundex" program that matches correctly spelled words phonetically, the company said.

Beyond Word Writer costs \$199.95. It runs on PC XT or AT compatibles with 512K of RAM and DOS 2.1 or later.

Timeworks Inc., 444 Lake Cook Road, Deerfield, IL 60015; (312) 948-9200, (800) 335-9497.

—Paula S. Stone

Dayfly Tracker Update Now in Development, 19 Stacks to Be Added

BY MARK BROWNSTEIN

An update to Dayfly Tracker that adds extra stacks is in development and will soon be announced by Dayfly Software Corp.

Dayfly Tracker, Release 1.4 is an enhanced version of Dayfly Tracker, which Dayfly claims was the first personal-computer management program, a category of recent interest by developers such as Lotus.

The new version has 19 additional stacks, which are analogous to stacks of paper or information on a desktop, said Robert Gilchrist, Dayfly's president. Users move information among stacks to manage and retrieve information. The model is simpler than a file cabinet, which is typical of most data management software, Gilchrist said.

The program also now includes a "Magic Key" that removes all but 32K of the program, enabling users to run applications without Dayfly Tracker. Users can also control colors and attributes of characters and background. Text formatting is improved, and users can now specify the number of lines of data to be printed on a page.

Dayfly Tracker 1.4 will cost \$149.95. Current users of Dayfly Tracker 1.1 may upgrade for \$55, and upgrades will also be available for users of earlier versions. Users of Dayfly 1.3, the company's database management software, may upgrade to Dayfly Tracker 1.4 for \$85, and registered users of both programs may upgrade for \$35.

Dayfly Software Corp., 17701 Mitchell Ave. N., Irvine, CA 92714; (714) 474-2901, (800) 367-5369 (outside CA).

Emerald City to Ship A Windows Version Of Lasertalk Program

Emerald City Software announced it will release in December a Windows version of Lasertalk, its Postscript programming tool now available on the Macintosh.

The program is targeted for application developers, high-end desktop publishers, and service bureau staff who need to debug Postscript programs, said Randy Adams, Lasertalk's designer. The new version for PC compatibles offers the same features and functions as the Macintosh release, he said.

Adams described Lasertalk as an interactive debugger for Postscript programs. A status window displays the contents of the Postscript stack and program variables as each line of Postscript code is processed. The program provides a browser to access Postscript dictionary keys and values in the Postscript printer memory.

It displays the contents of the printer frame buffer in a separate window to monitor the effects of Postscript operators, which describe Postscript functions.

Lasertalk PC costs \$399 and will run on any PC or PS/2 that supports Windows, and requires a laser printer with the Adobe Postscript interpreter.

Emerald City Software, 800 Menlo Ave., Suite 102, Menlo Park, CA 94025; (415) 324-8080.

—Bob Ponting

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NEWS BRIEFS

ORBIT SHIPS FORMSET, VERSION 2

Orbit Enterprises Inc. is shipping an enhanced version of its forms compiler and a new preview utility for the Hewlett-Packard Laserjet.

Formset, Version 2 compiles text files with embedded formatting commands into forms to download to a Laserjet Plus or Series II. Forms can be printed directly or overlaid, sending subsequent pages to the printer.

Version 2 can mix multiple fonts on a single line, add PCX graphics to forms,

and print lines of any thickness, according to the developer. This version also supports nested procedures, subroutines, horizontal and vertical justification, conditional processing, and a special symbol font designed for forms. The program still can use Laserjet soft fonts and font cartridges.

Bundled with Formset is Softjet, a page preview utility from Theta Systems of Vancouver, British Columbia. Softjet lets users see their forms on-screen before printing them.

Formset costs \$193.95, with a \$75

upgrade for current users. The program runs on PC and PS/2 compatibles with 384K of RAM and one floppy; Softjet requires a graphics monitor.

Orbit Enterprises Inc., Building 6, Suite 1, 799 Roosevelt Road, Glen Ellyn, IL 60137; (312) 469-3405.

ADDRESSLOPEL UTILITY PRINTS BULK

Microcomputer Systems & Consulting recently enhanced Addresslope, its envelope addressing utility, which will be able to print bulk mailings from an address file.

The \$50.95 RAM-resident program can automatically identify and retrieve a

letter's addressee from within a word processor and print an envelope, with or without a return address. Version 2 can store up to 16 captured addresses and print the envelopes at once, and it also supports additional fonts and the envelope tray on Hewlett-Packard laser printers.

Addresslope runs on PC and PS/2 compatibles and supports four envelope types and most printers but offers additional capabilities including cartridge and soft font support with Hewlett-Packard Laserjets.

Microcomputer Systems & Consulting, 1206 Canterbury Lane, Mansfield, OH 44906-3509; (419) 756-5295.

RATIONAL UPDATES DOS/16M

Developers can now write DOS programs that take advantage of up to 16 megabytes of RAM and guarantee they will run on any 80286- or 80386-based hardware platform, by using an update of Rational Systems' large-memory development environment.

Version 3.0 of DOS/16M also now automatically identifies the host hardware and performs the correct switching operation between real and protected modes for the computer's microprocessor, eliminating the need to install device drivers, according to Rational Systems.

DOS/16M costs \$5,000 for an Initial Development License, and the update is free to registered users who subscribe to the support service that costs \$180 per month.

Rational Systems, P.O. Box 480, Natick, MA 01760; (617) 653-6006.

WORDTECH RELEASES DBXL/LAN

Wordtech Systems Inc. has begun shipping DBXL/LAN, a networked version of its Dbase-compatible DBXL database program.

The multiuser version provides concurrent browsing, automatic record- and file-locking, automatic screen updating, data lock ownership, message sending, and edit detection, the developer said. Its files are compatible with Dbase files and DBXL/LAN can coexist on a LAN with Dbase III Plus.

DBXL/LAN costs \$599 with support for an unlimited number of users. Upgrades for current users who also have Networker Plus, Wordtech's RAM-resident networking management utility, cost \$359 for users of DBXL 1.1 and \$299 for users of DBXL 1.2.

Wordtech Systems Inc., P.O. Box 1747, Orinda, CA 94563; (415) 254-0900.

NINE NEW DEVICE DRIVERS TO SHIP

Renaissance GRX Inc. will soon ship nine device drivers that support Texas Instruments' new TIGA-340 software interface standard for the TMS340X0 graphics processors and plans to release one new driver each month through 1990.

The device drivers — which will support Microsoft Windows/286 and Windows/386, Lotus 1-2-3 and Symphony, Xerox's Ventura Publisher, and Autodesk's Autocad, Release 9 and 10 — are scheduled for release "as soon as TI makes TIGA-340 available, probably by early December," said Ron McAlhany, marketing director for Renaissance GRX. The company manufactures TMS34010-based high-resolution graphics boards.

Renaissance GRX Inc., 2265 116th Ave. N.E., Bellevue, WA 98004; (206) 454-8086.

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8NW105

HARDWARE

Hewlett-Packard LaserJet IID Prints on Both Sides of Paper

BY PATRICIA J. PANE

Hewlett-Packard Co. unveiled last week a major addition to its laser printer line that can print on both sides of a sheet of paper.

The duplex printer, dubbed the LaserJet IID, prints the paper on one side, then automatically feeds the paper back into the engine to print on the other side. The product can print as fast as 7.4 pages per minute, said Karl Robertson, product manager for HP's Boise, Idaho, division.

The printer comes standard with two 8½-by-11-inch paper trays, each holding 200 sheets of paper, Robertson said. The LaserJet IID can use letter- and legal-size paper, print in landscape or portrait mode, and prepare the pages to be bound either like a book or a calendar.

Optional trays allow the LaserJet IID to handle legal, executive, and European A4 paper. An optional automatic envelope feeder hooks on top of the first paper tray and plugs in to the side of the printer, printing up to 50 envelopes automatically.

Users can also choose an option from the control panel for printing different images on paper from each of the two trays

at the same time an address is printed on the envelope.

The LaserJet IID comes standard with 14 internal fonts and an S2 cartridge with 10 additional fonts. More fonts can be added with cartridges or by downloading from a floppy. All fonts can be rotated for landscape or portrait printing. The same font cartridges used for the LaserJet Series II can be used with the IID.

Switches on the front control panel let users control duplex printing, adjust paper orientation, set up the paper for binding, and select many other functions, Robertson said.

The printer uses the Canon RX engine, and the base configuration can print up to half a page of 300-by-300-dpi graphics, Robertson said. Full-page graphics can be achieved by adding 1-megabyte, 2-megabyte, or 4-megabyte optional memory boards, he said.

The LaserJet IID costs \$3,425 and is scheduled to be available this week. The optional automatic envelope feeder is \$350. Hewlett-Packard Co., Inquiries, 19310 Pruneridge Ave., Cupertino, CA 95014; (408) 973-1919.

Extended Systems Offers 2 Products To Expand Capabilities of LaserJet IID

Extended Systems Inc. announced last week two products that expand the capabilities of Hewlett-Packard's double-sided printer, the LaserJet IID.

The ESI-2041B Sharepool allows up to four users to share a LaserJet II or LaserJet IID, and the ESI-1312A printer driver supports IBM's Displaywrite 4 word processing software.

The 2041B is an internal device redesigned for the IID that slides into the printer. Four users can share the printer by off-loading printing demands from individual PCs and storing

files in the device's 256K memory buffer until the printer is ready to print. The 2041B also offers an optional 1-megabyte memory buffer upgrade.

The 1312A printer driver allows users of Displaywrite 4 to access the enhanced features of the IID, such as double-sided printing, without special command or escape sequences.

The 2041B costs \$495. The 2098A is \$995.

Extended Systems Inc., 6062 Morris Hill Lane, Boise, ID 83704; (208) 322-7163.

— Patricia J. Pane

30-MHz 386 Motherboard Is Fastest 386 System Around, According to Dyna

Dyna Computer Inc. introduced last week a 30-MHz 80386 motherboard primarily marketed to users who want to upgrade AT-class systems.

The motherboard uses a 10-MHz I/O bus and includes 64K of cache memory, no main memory (but room for 24 megabytes), and support for 80387 and Weitek 3167 coprocessors. The board comes with five 16-bit, three 8-bit, and one 32-bit slot.

According to Guy Duff, Dy-

na's national sales manager, a computer with the Dyna 386 Cache motherboard received a Norton SI of 36.8 in tests performed by the company and will outperform any existing 386.

The board can accept ESDI and SCSI drive controllers. It costs \$4,900. The company will introduce tower systems with the board later.

Dyna Computers Inc., 3081 First St., San Jose, CA 95134; (408) 943-0100.

— Jeff Angus

Erasable Optical Discs Challenge Market

BY STUART J. JOHNSTON

The recent swell of announcements of erasable optical disc subsystems appears to be threatening low-end hard disk and tape subsystem manufacturers, as well as some CD ROM vendors, industry observers say.

In recent weeks Next Computer, Sony, and Maxtor have all announced optical systems.

Protecting older technologies is the high cost of media, which usually comes down over time.

CD ROM VENDORS NERVOUS. Next's introduction of a computer that uses Canon's magneto-optical (M-O) drive technology as the primary disc storage — followed by last week's announcements that Sony and Maxtor also have M-O drives available — has some vendors more firmly established technologies nervous.

"If erasable cartridges become cheap, the technology could be perceived as a threat to the CD ROM industry," said Roger Stuehlf, editor of *CD-ROM Review*.

"We're watching it very carefully, but we don't think it will affect us in the short term," said Mike Kinney, director of product planning for Irwin Magnetics, an Ann Arbor, Michigan, maker of tape subsystems.

A tape subsystem that can hold 250 megabytes of data, as soon as media manufacturers introduce tapes long enough to hold that much data, currently costs about \$1,200, Kinney said. This is very close to the rumored \$1,495 cost of one of the Canon erasable optical drives to be offered by Next.

"It will probably not dislodge large hard drives in commercial applications because you can't afford to wait 100 milliseconds [for data access]," said Jay Bretzmann, senior analyst for optical technology at International Data Corp.

WHY SWITCH? Why switch from conventional technologies? The most common reasons cited by vendors of erasable optical drives are the large amount of data that can be stored and the transportability of the media.

"It's something the industry is going to move toward, but cost makes it impractical," said Susan Lammers, director of Microcros's CD ROM group. "CD ROM has the advantage as a proven technology," she added.

"Our drive is probably faster than a lot of Winchester hard drives," said Dana Gauthier, Maxtor's marketing director for optical products. "There's certainly an opportunity to replace magnetic tape as well as displace slower hard disks," he said. "It's

See Optical, Page 28

How Magneto-Optical Discs Work

Magnetic particles on media, such as tapes and hard disks, reorient to line up with a magnetic charge.

When heated to a temperature called the "Curie point," the particles lose their reluctance to reorientation — called "coercivity." That is, particles that strongly resist reorientation normally can be reoriented by an extremely weak magnetic field because of the temperature.

Hard disks and tapes use particles with a low coercivity, which means they can be reoriented by a relatively weak magnetic field. The disadvantage is that stray magnetism can scramble the data represented by their orientation.

In magneto-optical (M-O) discs, high-coercivity particles are heated with a high-intensity laser to the Curie point — about 572 degrees Fahrenheit — and then the data is written using a weak magnetic coil. Because the spot heated is only one micron wide, the data density is extremely high — up to 512 megabytes per side.

As soon as the laser is turned off, the spot cools almost instantly, making the data virtually immune to all but the strongest magnetic fields. For example, a magnet used to pick up autos in a wrecking yard.

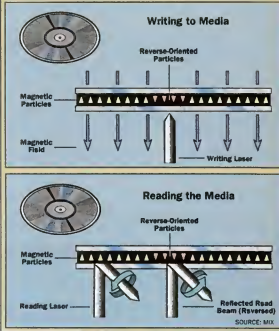
Also, unlike conventional media in which the magnetic particles lie flat, the particles are oriented vertically. On a blank M-O disc, all of the particles point up — all binary zeros. Flipping a particle down makes it a binary one.

The disc is covered by a clear protective layer so nothing ever physically touches the particles, eliminating the danger of head crashes. In addition, scratches and dust on the covering layer are outside the focal length of the laser, so they have no effect on data integrity.

Reading the data takes advantage of a unique characteristic of light: it is rotated, or "polarized," when it passes through a magnetic field. A laser is focused on the disc, and a detector analyzes the reflected light to determine whether it represents a one or a zero.

To rewrite, the old data is erased by reorienting all the particles to zeros, then the new data is written onto the blank area. Discs can be rewritten up to 10 million times, and data will maintain its integrity for 10 to 20 years.

Read-Write Magneto-Optical Media How it Works



Magnetic particles on magneto-optical discs are reoriented when brought to the "Curie point." Particles are readable because reflected light bends differently off a binary zero than a one.

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The performance to fly through heavy workloads.

FIVESTAR 286's provide the features and performance aggressive companies need to reach higher corporate goals. In fact, they're designed to run future as well as current operating systems.

The 286/10 is powered by an Intel 80286 microprocessor that operates at a fast 10 MHz, with zero wait states. With 640KB memory and 1.2MB floppy disk drive, you'll soar through today's popular business applications. Serial, parallel and game ports, and an enhanced 101-key keyboard, provide in-flight convenience.

The 286/14 is also powered by an Intel 80286 CPU, but operates at 14 MHz (with zero wait states) for even faster performance. It, too, comes equipped with 1024KB memory, 1.2MB floppy disk drive, serial/parallel/game ports and a 101-key keyboard. No doubt about it — it's a hot machine and a dream to fly!

FIVESTAR 386's.

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The incredible speed and power of FIVESTAR 386's have made them a leading choice of corporations across America for multitasking and sophisticated applications, including CAD. In fact, there's so much performance and value built into our 386's, it can take your breath away.

The 386/16 is fast. Very fast. That's because it features an Intel 80386 CPU operating at 16 MHz, with zero wait states. And its 1024KB memory and 1.2MB floppy disk drive will keep you airborne for long distances. Serial/parallel/game ports and a smooth performing 101-key keyboard are standard equipment.

Prices:

The 286/10 -
from \$1099.
The 286/14 -
from \$1499.



The 386/20. It's made for those who want to fly to the outer limits. With an Intel 80386 microprocessor operating at 20 MHz (with zero wait states) it'll move through the most complex applications with astounding ease. And you won't have to worry about running low on memory either. It not only features 1024KB of RAM and a 1.2MB floppy disk drive, it also has a 64KB cache memory. Naturally, it comes equipped with serial/parallel/game ports and a 101-key keyboard, too.

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Unbeatable ground support.**

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Products Extend Area Between PCs, Peripherals

BY PATRICIA J. PANE

Two new products are putting the "remote" in remote computing.

Network Technologies Inc. announced VOPEX-KMD, which extends the distance between a PC and its monitor and keyboard up to 500 feet.

Practical Peripherals Inc. has introduced the Microbuffer P/Link, a parallel printer interface extender with a buffer, that enables a PC printer to be placed up to 7,000 feet away from the host PC.

The Microbuffer P/Link comes with 32K of buffer memory and is available in six configurations from 32K to 512K, said Travis Tokuyama,



Network Technologies Inc.'s \$549 VOPEX-KMD extends the distance between a PC and its monitor and keyboard up to 500 feet.

Practical Peripherals' sales manager. Each model is Centronics- and Epson-compatible, Tokuyama said.

The P/Link transmitter is connected to the PC's parallel port, and the P/Link transceiver plugs into the printer's port, Tokuyama said. The 32K microbuffer P/Link (\$159) comes with 75 feet of RJ11 telephone cable and is available now. Beyond 2,000 feet, the company recommends twisted-pair cabling.

NTI's VOPEX-KMD is compatible with monochrome, CGA, and EGA computer displays, said Ruth Hackett, the firm's public relations manager.

The product's TTL video signals are converted to differential type signals, which allow up to 500 feet of cable to be driven

with no loss of resolution, according to Hackett. The transmitter connects to the video and keyboard port of the PC and has a local video output for a second monitor close to the computer, she said.

Each half of the VOPEX-KMD is housed in a 6-by-6-by-2 1/2-inch metal case, is shipped with 4-foot video and keyboard interface cables, and comes with a one-year warranty.

Available now, the VOPEX-KMD costs \$549, an interconnect cable is \$35 plus 5% cents per foot.

Network Technologies Inc., 1945 Elizabeth St., Aurora, OH 44202; (216) 543-1646, (800) 968-TECH.

Practical Peripherals, 31245 La Brea Drive, Westlake Village, CA 91362; (818) 706-0333.



Practical Peripherals' \$259 Microbuffer P/Link costs \$159.

Everex Ships Printer Add-Ons, OS/2

BY BOB PONTING

Everex Systems is adding several printer add-ons and its version of OS/2 to its product line.

The Everex Postcard is a Postscript-compatible raster image processor (RIP) that fits in an expansion slot on AT-compatible computers. The \$1,795 board connects to the video

interface on Canon SX laser engines. It is based around an 80186 processor running at 16 MHz with assistance from an 80287 math coprocessor.

The standard configuration comes with 3 megabytes of on-board RAM, which can be upgraded to 5 megabytes with a \$895 piggy-back memory module. Everex also bundles Post-

card with the Canon engine for \$3,495, providing a complete solution.

The Postcard runs the Bauer Postscript interpreter alone and includes 13 outline fonts from Bitstream that are width-compatible with those on the Apple Laserwriter. Another 22 outlines, widely-compatible with the Laserwriter Plus, come with the memory upgrade. A version of the Postcard for Ricoh laser engines, and the Postcard Plus for the HP Laserjet, will also be available before the end of the year, said William Lee, product manager at Everex.

Everex is also shipping a family of five font cartridges for HP Laserjet-compatible printers. The Hardfont Library includes cartridges that are functionally identical to HP's B, F, and Z cartridges, as well as two special-purpose cartridges for legal printing and spreadsheets. The cartridge prices range from \$160 to \$295.

The company also began shipping the OS/2 operating system for its line of 80286- and 80386-based Step PCs. The system costs \$325 and includes drivers for Step-specific hardware. The company will offer future versions of the system, including Version 1.1 with Presentation Manager, as they become available from Microsoft.

Everex Systems, 48431 Milmont Drive, Fremont, CA 94538; (415) 498-1111.

Optical

Continued From Page 23

entirely possible erasable optical discs could displace the portion of the CD ROM market that needs timely data in small quantities," he added.

"[Erasable optical discs] could replace some Winchester and tape drives within limits," said Al Hebert, manager of product marketing for Canon's drive. But he questioned whether there would be any impact on CD ROM vendors. "The special advantage of CD ROM has been the low price," he added.

PROHIBITIVE COST. One thing that may slow acceptance of the new technology is the cost of the technology, which ranges from \$50 per disk from Next to \$250 from Maxtor and Sony.

"I think people hurt themselves by not providing a lower price for the media," said Rich

Page. Next's vice president of hardware engineering.

Still, Page is optimistic about the future of M-O drives. "I think it will cut into the hard disk and tape subsystem markets and, over the next two or three years, I believe people will come to expect optical drives on computers," he said.

Stephen Burke, manager of corporate communications for Sony Corp. of America, agreed that erasable optical drives will probably cut into hard disk and tape drive markets. Despite slow access speeds, he said, M-O has other advantages, including the fact that the media's virtual immunity to stray magnetic fields and there is no contact with the read/write mechanism, "so there are no head crashes."

What will vendors of traditional storage systems do? "If we see [erasable optical] getting into our price range, we'll move very quickly to acquire the technology to compete," said Irwin Magnetics' Kinney.

Conographic Chip Will Support PDL Printers

BY MARK BROWNSTEIN

Development of a computer chip designed specifically to support the processing requirements of page description language (PDL) used for desktop publishing will be announced at next month's Comdex by Conographic Inc.

The computer chip will drive both printers and displays, allowing users to see an accurate representation of printer output on screen before printing, according to the company.

The company is currently developing the chip and is anticipating delivery in the third quarter of 1989. The chip will be the first of its kind, Luis Villalobos, president of Conographic said.

"There are a lot of good graphics chips out there," but none of the chips are capable of performing the specific processing required to convert page descriptions (such as Postscript commands) into printer control codes, Villalobos said. The chip will be based partially on the logic used in Conographic's Codebook 6000 printer controller card, which the company says has been certified Postscript compatible by an independent certification laboratory.

As a parallel processor, the

chip can operate independently of a main processor on the board, resulting in faster operation than boards using serial processing.

The company's current board can print pages of Postscript graphics at roughly the speed of current printer engines. Boards that use the new chip should be able to achieve the performance needed for improved printer engines, Villalobos said.

In addition, the chip can be used to display actual Postscript graphics onto standard or specialized monitors, according to the company. The user will be able to see, within the limits of monitor resolution, exactly what will be printed. This is possible because the Conographic design uses the same board to produce code to drive the printer engine and the signal to be displayed on a monitor.

The computer chip is currently being designed by Conographic and will be made available to board makers, in addition to its use in future Conographic products, according to Villalobos. No estimate of the price of the chip was available at press time.

Conographic Corp., 16802 Aston, Irvine, CA 92714; (714) 474-1188.

AMD's Laser Printer Controller Chips Speed Performance and Lower Cost

BY BOB PONTING

Advanced Micro Devices Inc. is releasing a pair of chips that will lead to faster laser printers for users and cheaper-to-produce makers for manufacturers.

The Am5957s Raster Printer Controller (RPC) and Am5957C Orthogonal Rotation Processor (ORP) are CMOS chips that can be used individually or together and within its original equipment manufacturers' next month.

The RPC provides bit-block-transfer functions, refreshes page memory, and serializes and sends the page buffer contents to the printer.

The RPC can also print black-on-white or white-on-black, fill characters with stored patterns, and merge text and graphics with background patterns.

The chip's maximum throughput is 45 pages per minute at 300 dpi or 25 pages per minute at 400 dpi, but the effective print speed depends on the speed of the controller CPU and the page complexity, the company said.

The ORP rotates character bit maps to 90, 180, and 270 degrees. It is designed to save internal font memory by provid-

ing on-the-fly rotation for landscape and two-sided printing. The ORP can rotate character bit maps as large as 64 by 64 pixels.

In quantities of 100, the RPCs cost \$35 each, and the ORPs \$12.65 each.

Owners of Okidata Microline Printers Get Free Retrofit

Owners of the Okidata Microline 320 and 321 qualify for a free retrofit to the new microline. According to Okidata senior vice president Dennis P. Flanagan, "if the printers are left on... for a long period there is a potential for excessive heat build-up, possibly a smoke, and a remote possibility of fire."

Users who own these printers are to get the retrofit performed by the reseller from whom they got the printer, said Flanagan's October 10 letter. The memo to distributors states the probability of danger is extremely low.

Okidata, 532 Fellowship Road, Mount Laurel, NJ 08054; (609) 235-2600.

— Jeff Angus

Cut the Baloney!



Here's Northgate's "NO BALONEY" approach to the Computer Business.

Cut the Baloney!

That's why Northgate is dedicating this portion of our ads to pointing out where others may fall short in giving you facts to base your buying decision. So for openers...

If you're waiting for some new "miracle" bus design before you buy—go get an abacus. The current bus will be the standard for a long time. And when one comes along that makes sense, Northgate will have it.

Northgate uses two benchmarks we believe in. PC Labs' Bench Test is superb. And for in-depth testing, we use Power Meter. When you're


Crackling 20MHz Performance in a Complete System with 28 Millisecond 65MB Hard Drive, Power Case and Monitor at the price others charge for 16MHz!

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JUST \$3,699.00**

And of course the motherboard has 387

Feature for feature, Northgate's 386/20SM is unquestionably your best buy.



NORTH: AT 800-666-1-8000

NORTHGATE 80386SM and 80286 Models

VGA VIDEO TWICE AS FAST AS MOST OTHERS... Again, optimized performance from Northgate. Just as we don't even bother with 16MHz 386, we've gone right past EGA straight to 16-Bit VGA and

Of course we still offer monographs featuring 14 inch flat-screen with 1000 line resolution capability in either amber or the increasingly popular paper white screen.

NOW, THE SYSTEMS WITH SCSI CAPABILITY... SCSI (Small Computer System Interface) is the technology of the future and North-

PRICE FOR ABOVE SYSTEM \$1,799.00

	VGA GREYSCALE	16-BIT VGA ANALOG	16-BIT VGA COLOR+	
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HARD DRIVE OPTIONS ADD:	\$190.00	\$290.00	\$495.00	\$1,995.00

MS-DOS 4.0 with GWBASIC \$95.00 MS-DOS 3.3 with GWBASIC \$75.00

Other Options Include Streaming Tape Backup, Hard Drives to 720MB, VGA and Desk
top Publishing/CAD Monitors to 37 Inch, Novell ELS Complete Network Systems and
Software.

computer shopping, ask for results of these tests. At least they're consistent and hard to "fiddle."

You'll find no benchmark baloney in Northgate advertising.

CUT THE VGA BALONEY!

If the ads don't say 16-bit VGA, you're getting only 8-bit performance. 16-bit VGA costs lots more. So a cheap price on a VGA system means you're not getting full value for your money. It's like XT vs. AT performance. 8-bit is half as fast as a true 16-bit board.

Many low-end VGA boards are incompatible with some software. Northgate gives you a VGA compatibility guarantee.

Northgate's 16-bit VGA is well over twice as fast as 8-bit VGA. Re-check the specs on that ad for the cheap-VGA system.

CUT THE KEYBOARD BALONEY:

Only Northgate provides OmniKey, the keyboard experts agree is the finest ever created. Others boast "clicky" keyboards but none have the intelligent, high production layout of OmniKey.

Ask what their keyboard weighs. Isn't it all plastic? Warranty? Northgate thinks enough of its customers to bring you OmniKey to

complement an equally uncom-
promising computer system!

CUT THE PHONE SALES BALONEY:

At Northgate, we can't "sell" you a thing. We can only help you get what you want. Test us. Talk to one of our account managers. Discover how much our people know about computers and can truthfully help you get what you want and need. No over-selling baloney here!

We can even give you names of Northgate owners in your immediate area so you can find out for yourself why our customers are so enthusiastic. Then call the other guys and ask the same kind of tough questions you ask us.

CUT THE TECH SUPPORT BALONEY:

Tech Support is integral to the computer business. Whether it's a failed part...a user unfamiliar with configuring a peripheral...software installation.

When you're shopping, check our Tech Support Department. Discover how knowledgeable and helpful they are. Ask about the unique way service is handled at Northgate.

Northgate was first to guarantee shipment of user replaceable parts—

ONVERTING AT OUR EXPENSE—without first receiving the failed part. Result: Downtime is reduced to one day.

Many others require you to return the part first. Then you face days or weeks of not being able to use your computer. Many companies won't send parts to you at all. You must ship back the whole machine. Costly, inconvenient, time wasting.

Just as important is the warranty period. Look closely at the ads. You'll see the line "manufacturer's warranty applies" in many. That means if the manufacturer put a one-year warranty on the part, but it sat around a distributor's for a few months before being sold to your source, guess how much life is left on the warranty.

Northgate warrants all parts for one full year. Should the system need to be returned, service is free, and we warranty every part of the system, disk drives, hard drive, monitors, etc.

CUT THE LOW-BIT PRICING BALONEY!

Northgate prices its products as complete systems. We do it that way to assure you the best possible value for your computer investment.

From experience we know the components we include are those

you'll end up buying sooner or later. By including them in a Northgate system, we can save you the money, the work and the confusion of adding a part later.

Many in our business advertise prices for only partial systems to look more competitive. Less RAM than you know you need. A hard drive so tiny it's laughable. An out-of-date monitor. And while the price for the system may catch your eye, just try that grading, like the car business, that's where they get you. One highly-touted company has the nerve to charge \$1,000 per meg of RAM (true costs are only about \$500). Such an "up-charge" is part of the Baloney.

YES, BALONEY ABOUNDS.

And we can't cover all of it in this ad. Northgate plans to include a continuing "No Baloney" section in all future ads. We'll up-date the current scene as we see it.

Maybe you agree with us. Maybe not. But if you find what you think is "baloney" in anything we publish, we'd like to hear from you. Write our Baloney Control manager, Sonia Held.

All we're saying is "get straight facts before you buy." If you don't agree that's good advice, go ahead and buy the Baloney.

OS/2®
Ready



all offer the following advanced features:

gate offers it today! Our SCSI model has an SCSI host adapter. Connect as many as 7 intelligent devices—hard drives, tape backups that can run in background, optical laser drives, etc.

Now SCSI technology no longer costs a fortune. Check our prices for SCSI with 40MB hard drive. Performance tips with these drives—under 18 milliseconds access speeds, ideal for intensive data base applications, or loading your spreadsheet in a blink.

Check the prices below and phone for more details on how Northgate's SCSI technology will put more zip in your system performance at a price that more than pays for itself!

ESDI HIGH SPEED DRIVES TO 768 MEGABYTES. Northgate brings price reality to high capacity hard drive systems. Where others

charge outlandish prices, Northgate's down-to-earth pricing puts these memory monsters well within your budget. Cost per megabyte is nearly halved when you enter their realm.

OMNIKEY/102 IS A NO-COST OPTION. You'll delight in using OmniKey/102. Every magazine review and thousands of users agree. OmniKey is the standard against which all other keyboards can be judged. And it comes with a Northgate system as a no-cost option. (Oh yes, if you don't buy a Northgate system and still want the best keyboard separately for \$99.00. See our ad.)

Add it all together. Compare with the other guys. Then call Northgate and feel confident you're buying the best!

ALL NEW FROM NORTHGATE...THE 286 SUPER MICROCOMPUTER LINE

A Superb Family of 286 Systems... From the 20MHz, fastest in the industry; The 16MHz, for speed at a savings; To our XT-Killer 12MHz...

TRUE 20MHz \$2599.00
complete system

COMPLETE WITH 65MB HARD DRIVE, 2 FLOPPIES,
AMBER OR WHITE 14" MONITOR AND OMNIKEY/102

NORTHGATE takes 286 technology to its peak with our 20MHz model. Featuring a genuine 80C286 Harris 20MHz processor for maximum reliability. Our 286/20SM is a true Super Microcomputer. Designed by Northgate, for Northgate exclusively.

You can order it with our spectacular 16-bit VGA graphics. With your choice of RLL, ESDI and SCSI (Yes, it runs under SCSI) hard drive systems. And, Northgate's exclusive OmniKey/102 is yours at no extra cost—still another Northgate Quality Feature.

Realistically priced, and featuring a broad selection of drives and video displays, 286/20SM has a new Northgate feature...no other system in the industry can offer...

INTRODUCING..."LIGHTNING ALLEY"

All Northgate 286 systems are designed with a slot for extended memory we call "Lightning Alley." And it's a part of our exclusive design for our 286 systems.

Simply stated, "Lightning Alley" lets you add a RAM card that runs at processor speed, not bus speed. No other system we know of does this. They all run at bus speed, 8 or 10MHz.

"Lightning Alley" boosts extended memory functions up to twice the performance—or more—of any other system. So if you're using extended memory in your system as a file server, for Xenix, AutoCAD, OS/2, Windows, you'll see your programs

really fly! You'll see the same difference as when you went from XT to AT.

YOU KNOW IT'S QUALITY FROM THE START...

When your Northgate system arrives, you'll know at once you've purchased quality. It arrives in a carton that could safely ship eggs. Unpack your Northgate, plug it together and turn it on. You'll be dazzled by the VOPT program that comes up every time to make sure your hard drive remains optimized.

All Northgate systems come complete with documentation written for the layman or the pro. And if you have any questions, your Northgate Tech Support rep is as close as your phone. With fast, friendly help, no matter what your requirement.

ALL THE SAME FEATURES AS OUR 386/20SM...

Check all the features we've listed here. They cover both our 386 and 286 systems, and all add up to the most advanced computer ever offered to get your work done faster.

Then check Northgate's unique service policy, our quality reputation and our pricing.

You simply can't find a system at the price that out-performs Northgate.



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Ideassociates Rolls Out MCA Memory Board

By Ed Scannell

BILLERICA, MA — Ideassociates Inc. last week rolled out an 8-megabyte memory expansion board designed specifically to take advantage of the Micro Channel Architecture used in IBM's Personal System/2 Models 70 and 80.

Christened Ideamax 80, the board has a dynamic wait-state design that allows it to operate in any Model 70 or 80 — including the Model 70-A21, which operates at 25 MHz.

The new board uses Ideassociates' On-board Memory Checking Diagnostic Scheme (OMCDS), which reportedly



The Ideamax 80 is a 32-bit MCA expansion board which offers up to 8 megabytes of expanded memory for the IBM Models 70 and 80.

offers high levels of reliability. For instance, when a memory module fails in a traditional memory board, it breaks down and must be removed.

But with the Ideamax 80, the board continues operating because OMCDS disables the bank of modules where the failure occurred, a spokesman said.

Users can incorporate any combination of extended or expanded memory

using the board, which offers up to 8 megabytes of memory using 1-megabyte SIMMs and up to 2 megabytes using 256K SIMMs.

Because the modules are mounted horizontally on the board's surface, they need less space than more conventional chips, the company said. Both 256K and 1-megabyte random-access memory chips can be used on the same board.

Also, Ideamax can use 100- and 120-nanosecond memory modules as well as 80- and 85-nanosecond modules.

Ideassociates officials claim the board can be installed "in seconds" due to the use of on-board read-only memory, which automatically detects the amount of memory both in the system and on the board.

Ideamax 80 includes a RAM disk driver and a print spool program to increase productivity.

The suggested retail price of the board is \$495 without memory and will be available by the end of November.

Ideassociates Inc., 29 Dunham Road, Billerica, MA 01821; (508) 663-6878.

Quadram Enhanced I/O Expansion Board for AT Uses Bus Speeds in the 8- to 10-MHz Range

Quadram Corp. recently announced the Quadport AT+, an I/O expansion board for the PC AT and compatibles that uses bus speeds in the 8- to 10-MHz range.

This enhanced version of the Quadport AT offers a parallel port and five serial ports. All ports are handled on the board. No daughterboards are required.

It is compatible with all versions of DOS and takes advantage of the capabili-

ties of DOS 3.0 and later versions to recognize more than two serial ports.

Quadport AT+ will be available in December for less than \$500, Quadram said. The Quadport AT, equipped with one serial and parallel port, will continue to be sold. It will remain priced at \$185.

Quadram Corp., 1 Quad Way, Norcross, GA 30093; (404) 923-6666.

— Robert Snowden Jones

Dell Upgrades 386-Based PC, Raises Prices

Dell Computer Corp. announced last week it has upgraded its high-end 80386-based machine to offer more memory and a 16-bit video graphics adapter.

The 20-MHz Dell System 310 is now available in four standard models, up from the lone standard, 1-megabyte model. The machine now also comes in 4-, 8-, and 16-megabyte models. All have standard a new 16-bit VGA graphics adapter that improves video performance, instead of the 8-bit VGA adapter used in the earlier model, said Brian Fawkes, representative of the Austin, Texas-based direct mail-order manufacturer.

Customer demand for higher-performance machines led Dell to offer machines with more memory and faster graphics, Fawkes said.

The System 310 comes with 4 megabytes of memory, a 40-megabyte hard drive, and a 16-bit VGA Color monitor, and costs \$6,399, up from \$4,299 for the 1 megabyte of RAM, 8-bit VGA monitor model that was standard in May. The 4-megabyte model with a 322-megabyte hard drive and a Color Plus monitor is now \$9,899, up from \$7,399.

Dell Computer Corp., 9505 Arboretum Blvd., Austin, TX 78759; (800) 426-5150.

— Paula S. Stone



WE'VE BUILT A BETTER BROOKLYN BRIDGE WITH VERSION 2.0!

Why Is Our Bridge Better? Because The Brooklyn Bridge® that John Dvorak, PC Magazine, chose as "The Best of the Best Utilities,"* now gives you more choices!

The Brooklyn Bridge Version 2.0 is more flexible than ever! We've always been the leading file transfer and access utility between IBM® compatible microcomputers with any size floppy or hard disks. Now we give your customers a choice between our file manager for the novice user or DOS commands for the more experienced user.

Our new file manager lets you view both local and remote files at one time using a full-screen, dual-directory display with 1-2-3* style menus. Or, you can still transfer files and access peripherals using DOS commands at the command line, within an application, or within your current menu system.

One Printer Can Now Work For Two People!

In addition to our menu system, The Brooklyn Bridge lets you share printers and gives them access to other peripheral devices like tape back-up systems.

Don't Tie Up Your Computer Sorting A Database! RUN Gives You Twice The Power!

Our exclusive Brooklyn Bridge feature, RUN, provides for dual independent processing which lets you use both the remote and slave computers at one time.

Our DOS Utilities Guarantee Easier DOS Processing!

BACKUP, MOVE, REMOVE and COPY save time by allowing you to work with multiple files at one time.

BACKUP saves time by updating your disks quickly and backing up only files that have been changed or created since the last time you

disk was backed up.

MOVE lets you work twice as fast by automatically deleting the original once a file has been moved. If confidentiality is crucial, **REMOVE** has a security option to insure that deleted files are unrecoverable.

Now you know we have built a better Brooklyn Bridge, while still using the fastest attainable serial transfer rate at 115,200 baud, and still saving your customers money by eliminating the expense of an additional external drive.

The Brooklyn Bridge is available through your local dealer or directly from White Crane Systems, Inc. For more information please contact White Crane at (404) 394-3119.

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POWER TOOLS. POWER MINDS. POWER PRODUCTS.

When you combine powerful tools with powerful thinking, you get powerful products. ● PC Designs puts this combination together for you. They've designed and manufactured microcomputers in Oklahoma for over three years. Innovation, high performance, reliability — they're powerful tools in the hands of PC Designs. ● Take the GV-286 and GV-386, for example — two of the fastest, and fairest priced, microcomputers around. The 286 was "Editor's Choice" in *PC Magazine* last year — one of PC Designs' many successes. ● Whatever choice you make, PC Designs offers you unparalleled service and support. Through Sorbus,SM you have the option of a maintenance contract for nationwide on-site or carry-in service. ● But service is more than a contract. In Oklahoma, it's a Product Center with customer-centered attention. Nationally, it's putting your needs first — offering informed advice, solving complex problems, providing excellent warranties. ● So whatever you're building — build it with the powerful tools of PC Designs.

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- 1.2MB or 720KB floppy drive
- 101-key keyboard

GV 286* - \$1299.

- 80286, 12MHz
- 512KB, zero wait-state
- 32KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- 101-key keyboard

*PC Magazine's "Editor's Choice" on October 13, 1987



GV 386/16 - \$2199.

- 80386, 16MHz
- 1MB, zero wait-state
- 64KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- 101-key keyboard

GV 386/20 - \$2599.

- 80386, 20MHz
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- 64KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
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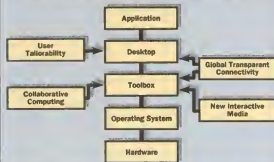
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MACINTOSH NEWS

The Macintosh Architecture Model



Apple Computer's five-layer architecture model is the basis for explaining how the Macintosh platform will evolve.

TECHNOLOGY UPDATE

Apple Looks to Mac Oasis To Bring it Into the Future

Apple Works to Extend the Mac Architecture

BY MARK ARNETT

As Apple Computer Inc.'s advanced technology group works to extend the Mac in new media, group computing, connectivity, and user programmability, the company is counting on the existing Mac architecture to continue as its underpinning.

The five-layer architecture first came to light last spring under its former code name, Oasis. Since then, Apple has used the model as the basis for explaining how new products fit into the existing ones, as well as to argue the Mac's strengths compared to IBM's SAA strategy, which includes OS/2.

MAC BETTER? "When we explain our system in terms of this model, customers look at it and look at like things such as OS/2 and Presentation Manager and

understand clearly why the Mac is better," said Chris Espinosa, product marketing manager in Apple's advanced technology group.

Apple's recent introduction of the Mac IIx, essentially a Mac II with a Motorola 68030 microprocessor, was an improvement at the lowest level of the model. The 68030's data and instruction caches, as well as its on-board memory management unit, improve the machine's processing speed and capability to run multiple tasks under future operating systems, according to Apple officials.

One level up is the Mac operating system. Through improvements to the operating system, Apple intends "to improve existing applications and accelerate the development of whole new classes of applications," Espinosa said.

[See Oasis, Page 34](#)

Accelerator II From Daystar Speeds up the Macintosh II

BY LAURIE FLYNN

Daystar Digital demonstrated recently a 33-MHz accelerator board for the Mac II that Daystar claims doubles the speed of the computer.

The product, based on the Motorola 68030 and called the 33/030 Accelerator II, connects to the motherboard of the Mac II and uses the original 68020 socket rather than an add-in slot, according to Andrew Lewis, president of Daystar Digital. When installed as a Nubus card, the accelerator is hampered by the 10-MHz speed of the slot, he said.

The 33/030 product features a memory-caching process that uses 32K of 25-nanosecond static memory.

The 33/030 will be available in December for \$6,000. An optional 68882 floating-point processor will cost \$1,000. The card also supports the Mac's original 68881 coprocessor.

Daystar Digital, 5556 Atlanta Highway, Flowery Branch, GA 30542; (404) 967-2077.

Avatar Adds DFT Support for Mac

Mac Mainframe II Lets Users Log Onto Multiple Hosts Concurrently

BY LAURIE FLYNN

Avatar Corp. has added Distributed Function Terminal (DFT) support to its Mac Mainframe II communications product, enabling users to run multiple mainframe sessions simultaneously, the company announced.

With the new feature, Mac II users can log onto multiple hosts concurrently in separate windows. DFT support is already widely available to users of IBM

PC-to-host communications products, according to Rosemary Clinton, Avatar manager of marketing and communications.

"The ability to run multiple sessions at one time simultaneously is something power users have always desired, but that has typically not been available for the Macintosh as far as mainframe communications are concerned," according to Joyce Enos, Mac Mainframe product manager.

With Apple's Multifinder, users can also run Mac applications at the same time, cutting and pasting between programs and host sessions.

The company also improved positioning selection and keyboard help-screens, the company said.

Mac Mainframe II/DFT is priced at \$1,295. Current users can upgrade for \$495.

Avatar Corp., 99 South St., Hopkinton, MA 01748; (508) 435-6872.

IDD Plans to Ship CAD Program With Range of Tools

BY LAURIE FLYNN

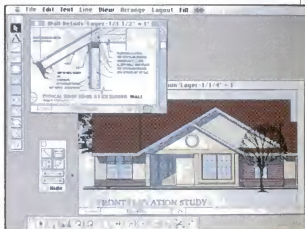
Innovative Data Design (IDD) Inc. plans to ship in November a mid-level color CAD program intended for both engineers and graphic design professionals.

The program, called Dreams, incorporates object-oriented shape tools, which can be accessed from floating palettes that are always active, the company said. The program supports drawing sizes of up to 8 square feet, with easy access to all parts of the document.

Pop-up menus include options for configuring tools. "We only present the appropriate choices," said IDD president Paul King. The program's available palettes include draft, accessory, and dimension.

Dreams' range of tools includes support for Bezier curves, spline curves, parallel lines, and fast rotating and dimensioning. The program supports zooming and has a magnification of up to 32 times.

Users can access up to 256 colors per drawing and create their own colors and palettes. The program also supports gray-



IDD's Dreams program offers object-oriented shape tools accessible from floating palettes that are always active.

scale output.

"For all design-related markets, Dreams offers a powerful drawing environment that lets designers concentrate more on design and less on mechanics," said King.

Dreams is priced at \$500 and runs on the entire line of Macintosh. IDD also offers Mac Draft, which it began shipping for the Macintosh in 1985. The price of Mac Draft remains \$269. Current users of Mac Draft can upgrade to Dreams for \$200.

Dreams will join the Macin-

tosh market for sophisticated CAD software with Versacad and Autocad. Generic Software is also planning mid- and high-end CAD software for the Mac.

IDD plans to release a series of palettes, the first of which will be available for engineering professionals in early 1989. Architectural symbol libraries are also in the works for a variety of vertical markets.

Innovative Data Design Inc., 2280 Bates Ave., Suite A, Concord, CA 94520; (415) 680-6818.

Irwin Offers Excelerator Board for Mac

BY MARK BROWNSTEIN

Irwin Magnetics, a company that has made its reputation with streaming tape backup devices, this month entered the Macintosh enhancement product arena with three accelerator boards and two large screen monitors.

The Excelerator boards are said to boost the performance of Macintosh SE computers by up to eight times. The XL board replaces the Mac SE's 8-MHz processor with a 16-MHz 68000 processor chip. It also provides

32K of high speed static RAM with zero wait states.

The XL20 replaces the 8-MHz 68000 chip with a 20-MHz 68020 processor, while the XL25 makes the replacement with a 25-MHz 68020 chip.

The 19-inch Powerview monochrome monitor, designed for systems with an XL board, features 1024-by-890 resolution and is shipped with an accelerated graphics controller. The Powerview XL includes the monochrome monitor and a graphics controller for use with the XL, XL20, or XL25 boards.

Software shipped with the monitors allows users to select display options, including big screen only, both screens, and image magnification.

All products are now shipping, according to sources at Irwin. The XL board has a list price of \$499. The XL20 is priced at \$999, and the XL25 is selling for \$1,699. The Powerview package sells for \$1,999, while the Powerview XL package will sell for \$2,399.

Irwin Magnetics, 2101 Commonwealth Blvd., Ann Arbor, MI 48106; (313) 930-9000.

Oasis

Continued From Page 33

One example of this might be Apple's announced, but not yet delivered, 32-bit color software for the Mac II. Apple officials have given vague descriptions of an upcoming 32-bit system software package that sources close to the company said will replace Multifinder with multitasking that relies on the hardware memory management for better performance.

Apple also is reported to be developing a graphics model that can be used for the

display and its printers, akin to Adobe Systems Inc.'s Postscript and Display Postscript.

At the next level, the Toolbox, Apple hopes to offer tools for animation, voice input and output, and 3-D graphics, enabling support of "new interactive media," according to Espinosa and other Apple officials. Apple is also adding communications tools, such as the recent announcement of support for TCP/IP and development of the connectivity language, CL/I, in its quest to achieve "global transparent connectivity" and simplify collaborative computing.

SEE HOW IT FITS. "One of the problems as

the Macintosh system has grown is that there is so much stuff that when we introduce new products like CL/I, it's hard for people to see how that fits," Espinosa said.

Those tools, similar to the graphics and other routines stored in the Macintosh's read-only memory, will be directly available to software developers to make them simpler to implement and better performers than if they had to be programmed.

At the desktop level, Apple officials like to compare the machine to the dashboard of a car—but reconfigurable, to meet the company's goal of "user tailorability."

Vendors Ready Product Debuts For Mac Show

By LAURIE FLYNN

ANAHEIM, CA — The opening of the Macintosh Business Conference and Exposition here this week is expected to draw as many as 10,000 corporate attendees and set the stage for a slew of product announcements.

The show will also mark the first meeting of the Apple Professional Exchange, a user group formed earlier this year for corporate Macintosh users and vendors. The new group, formerly known as the National Apple Professional Information Exchange, currently has about 100 corporate members, according to Dash Chang, president of Chang Labs, of San Jose, California, and one of the group's founding members.

Among those companies unveiling new products is Mirror Technologies of Roseville, Minnesota, which will show the Visionscan II scanner and several storage devices. The Shadow line of external drives is available in capacities ranging from 30 to 140 megabytes and offer 19-millisecond access times. The Shadow RM20 is a removable storage device using 20-megabyte disks, according to the company.

Survivor Software Ltd. of Inglewood, California, will announce the Macmoney Invoicer, an add-on module for the company's Macmoney financial management program. The program will be available in the first quarter of 1989 for between \$50 and \$80, the company said. Tri-Data Systems Inc. of Sunnyvale, California, will announce shipment of a IBM 3287 printer emulation program and support of multiple AppleLink zones for its Netway 1000 gateway.

NEWS BRIEFS

RADIUS EXTENDS WARRANTIES

Radius Inc. has extended the warranty on its line of displays and accelerators from 90 days to one year, the company announced.

The new warranty covers all products purchased since July 1, 1988.

Radius Inc., 404 E. Plummeria Drive, San Jose, CA 95134; (408) 434-1010.

ALISA SOFTWARE FOR SQL-NET

Oracle Corp. has announced it will bundle Alisa Systems' TSS-Net DEC-Net Protocol and Net Control Software with its Macintosh database software.

The addition of the Alisa software to Oracle's SQL-Net will allow Mac users easier access to DEC databases, the companies said. "Now that Oracle is including it in their package, the user can plug and play," said Alisa president Bob Denny.

The DEC-Net protocol software is part of Alisa Systems' TSS-Net product, which sells for \$495 per Mac. Users requiring mail- and file-sharing features can still purchase that program from Alisa.

Oracle Corp., 20 Davis Drive, Belmont, CA 40002; (415) 598-8000.

Alisa Systems Corp., 221 E. Walnut St., Suite 175, Pasadena, CA 91101; (818) 792-9474.

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INDUSTRY

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Databases/DOS

Product	Vendor
1 Dbase III Plus 1.1	Ashton-Tate
2 Paradox	Borland International Inc.
3 Rbase for DOS 2.1	Microm
4 Q&A Database 3.0	Symantec Corp.
5 Reflex	Borland International Inc.
6 PC-File Plus 2.0	Buttonware
7 R & R 3.0	Concentric
8 PFS Professional File	Software Publishing Corp.
9 Database, Release 3, 2.5	Database International
10 Foxbase Plus 2.10	Fox Software

Graphics/DOS

Product	Vendor
1 Harvard Graphics	Software Publishing Corp.
2 Freelance Plus	Lotus Development Corp.
3 Gem/3 Draw Plus 2.0	Digital Research
4 Graphwriter II	Lotus Development Corp.
5 Diagram 4.0	Computer Support Corp.
6 Micrografix Design 1.2	Micrografix
7 Picture Perfect 4.0	Computer Support Corp.
8 Chartmaster Premium Pak 6.21	Ashton-Tate
9 Window Graph Plus	Micrografix
10 Timeline Graphics 1.1	Symantec Corp.

SOURCE: EQHEAD DISCOUNT SOFTWARE, BASED ON GROSS CORPORATE SALES BETWEEN AUGUST 12 AND SEPTEMBER 12.

Former IBM Exec to Run New Ashton-Tate Division

BY SCOTT MACE

Keeping pace with Lotus Development Corp. and Microsoft Corp., Ashton-Tate has recruited a former IBM executive to run a portion of its applications development operations.

William P. Lyons, most recently vice president of software marketing in IBM's national distribution division (NDD), was appointed president of Ashton-Tate's newly created PC applications division.

Lyons, a 19-year IBM veteran, has already assumed his post and will run the division from Ashton-Tate's Connecticut facilities, where he will oversee word processing, decision support, and presentation graphics products into a single software development of future Ashton-Tate DOS and OS/2 products, Lyons said.

The new division marks the completion of a recent restructuring at Ashton-Tate. The company has formed Macintosh applications, PC applications, and publications divisions in addition to its existing database division.

Lyons has worked in the PC area since 1983 when he joined IBM's entry systems division

(ESD), in Boca Raton, Florida. In his five years at ESD, Lyons was also division director of marketing and general manager of personal systems marketing at NDD.

Earlier this year, former IBM executives Frank King and Michael Maples accepted senior positions at Lotus Development Corp. and Microsoft Corp., respectively.

Adapso Software Groups Merge

BY RACHEL PARKER

The two sometimes overlapping software groups in Adapso have merged into a single software products group.

At a closed board meeting at the Adapso management conference held in Dallas earlier this month, the microcomputer products section of Adapso agreed to merge with the software products section immediately, according to Esther Dyson. The editor of the newsletter *Release 1.0* presided over the meeting.

Some microcomputer publishers feared they would be

■ PROFILE

Aldus Exploring New Markets to Build On Desktop Publishing Success Story

BY STUART J. JOHNSTON

A leader in the desktop publishing boom, Aldus Corp. is now targeting new markets in an attempt to maintain its sales expansion while carefully managing its operations.

Aldus' sales grew 255 percent in 1987 to \$39.5 million, earning it a spot among the 10 largest American microcomputer software companies just three years after the company was formed.

"The financial analysts are predicting that this year we'll do somewhere between \$70 and \$75 million," said president and founder Paul Brainerd. That target assumes Aldus' sales will grow 90 percent over 1987 level. For the first six months of 1988, Aldus grossed \$35 million.

That growth rate reflects the continuing popularity of desktop publishing, an area Aldus pioneered with its Pagemaker page layout program for the Mac.

BROADENING PRODUCT BASE.

Wary of becoming dependent on a single product for sales, Aldus has strategically looked outside the company to acquire complementary products. Internal development efforts are concentrated on future releases of Pagemaker for the Mac and PC.

Can the company keep up the spectacular growth that took it from a studio apartment to a more than 400-employee company in less than five years? Brainerd seems confident it can.

The company is looking to expand into other platforms, such as the Unix-based Sun and Next computers, Brainerd said. He also hinted that a networked multiuser version of Pagemaker is under consideration. Another



Aldus founder Paul Brainerd coined the term "desktop publishing."

area of interest, one that the company entered when it acquired Snapshot, is electronic imaging.

DESKTOP PRESENTATION MARKET.

While the company's fortunes are based on Pagemaker, Brainerd feels the desktop presentation market could be as big as desktop publishing, but cautions "there's a lot of competition."

"The challenge is getting to all those people who are generating presentations," Brainerd added.

Observers find it difficult to criticize how Brainerd has managed Aldus, but some believe the desktop presentations market is less of a sure thing than desktop

publishing was.

"I think that's a fantasy," said Jeff Tarter, editor of *Softletter*, in Cambridge, Massachusetts. "It's going to be very competitive and there's so little to differentiate the products that I get confused and so do the users."

ELECTRONIC IMAGING. But Tarter believes Aldus is on the right track with its electronic imaging and multiple-platform strategies. "I believe electronic imaging is going to be a very big market in four or five years when scanners will be everywhere," he said. "It was good thinking of Aldus to get a foot in the door even if it doesn't generate revenues for a while."

Tarter said he feels developing a Unix-based workgroup publishing product would be a good move for Aldus. "That's where the big money is in that business," Tarter said.

Brainerd's previous experience as a vice president with newspaper publishing system developer Atex Corp. gives him a superior knowledge of workgroup issues, Tarter added.

With Pagemaker and other desktop publishing product, Brainerd believes Aldus is bringing the power of the press to individuals. That has been part of his goal for Aldus, which was named after Aldus Manutius, a 15th-century scholar who, with Gutenberg, helped popularize printing and publishing.

"We wanted a company name that reflected human values," Brainerd said.



STATE OF THE INDUSTRY ■ BY RACHEL PARKER

Publishers Walk Tightrope Between Direct Sales, Resellers

The first battle in the minicomputer/microcomputer war will not take place on the desktop but in the distribution channels.

For nearly two years, PC software publishers like Ashton-Tate and Lotus have been making noise about moving their applications up the corporate ranks — offering the power of their MIS packages on more powerful PCs. The guys who have made millions selling packaged software through resellers are telling us that they'll provide minicomputer and even mainframe versions of their popular packages.

At the same time, minicomputer vendors such as Oracle and RTI have hungrily eyed the fast-growing PC software market. With the PC gaining power and speed, minicomputer publishers reason that these systems will be able to run their software at the desktop.

While publishers scout each others' markets and ready products, though, another issue is rearing a troublesome head: distribution.

PC publishers have struggled to get and maintain good relationships with both distributors and resellers. It is a kind of love/hate relationship, with both the vendors and resellers needing each other to make money but resenting the degree to which the other eats into his profits.

Selling to corporate America is an especially prickly thorn for both publishers and resellers. Trying to ease the purchase of hundreds of copies of software, publishers have flirted with the notion of a direct sales force. But resellers objected loudly to such efforts, which they see as attempts to undermine their own sales efforts. From this conflict we've gained the hybrid corporate selling force — the gang of vendors' reps that evangelizes a product, then points buyers toward a local reseller to actually fulfill the sale. Then the reseller can establish a relationship with the customer, offering service, training, and add-on packages.

But PC publishers are beginning to see that this team approach to selling may not work when the product is something foreign to the retailer — like a translator package that lets a PC product talk to a mainframe. With this kind of product, new technical issues and buzzwords arise, such as communications protocols on the host and terminal emulators.

Using a complex network of direct sales forces and systems integrators, minicomputer publishers have figured out how to get that software buyer in the PC market, though. Although PC buying is more centralized than it once was, it is not universally handled through a single office.

Despite the move to more systems-oriented packages, none of the publishers feel they can give up the retail channel for distributing a wide range of potential PC software buyers. And this is where both the minicomputer and microcomputer sellers will find themselves trying to balance on a sharp razor: developing and maintaining good relationships with the retail channel for some products while sending a direct corporate sales force to visit MIS departments to promote and sell systems-oriented products.

Another hybrid category of reseller is bound to emerge as publishers try to cross into new markets. At this month's Adapso meeting in Dallas, publishers from both sides of the computing world tried to figure out how they could sell emerging products without cannibalizing their existing sales channels. How can a publisher sell certain levels of its products through its direct sales force while leaving low-end, PC-bound products for the

channel? And how can publishers establish a system to reliably handle customers' questions when conflicts or compatibility problems arise?

The next-generation software will require a next-generation reseller — one who can assist a corporate buyer make a strategic decision about which database system to buy. As such, these sales can take a long time to close as the buyer evaluates all his options. At the same

time, these resellers will carry a variety of packages from competing vendors.

This is likely where the battle between Dbase and Oracle will take place, where groupware will be sold effectively, and where the myriad vendors who've announced Unix products will try to get some attention. As these publishers move into each others' markets, a middle ground of distribution will emerge — and will be fought over.

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TECH STREET ■ By JOHN GANTZ

Listening for the Chain Saw on the Dark Side of Tech Street

This being the evening that Main Street battens down the hatches against hobgoblins, ghosts, warlocks, gargoyles, and other things that go bump in the night, maybe it's time we took a walk down the dark side of our own Tech Street.

Let's screw up our courage, put our hand in the hole in the hollow tree, and see if we pull out a secret message or a bloody stump. Let's sneak past a few crypts, see if those are puncture wounds or zits on our neck, and discern once and for all whether that strange noise we hear is the neighbor's motorcycle or Leatherface's chain saw idling in the basement.

But let's whittle while we do it, OK?

And let's start with ghosts. If there's one that haunts the industry more than any other, it's the ghost of Ovation. Plenty of companies in our business have heard the minister recite the ashes-to-ashes theme, and plenty will hear it in years to come. You might even say the first was a company called Viatron, which introduced and manufactured a device called The Everything Terminal that in 1968 bore an uncanny resemblance to a PC of today. But there are other names known to us, from Columbia Data Systems and Gavilan to Victor Technologies and Vector Graphic.

But Ovation's ghost is more restless than most. The company, which died well after receiving rave product reviews for its

integrated spreadsheet, word processor, database, and graphics package and before shipping any real product, left just, well, so unfinished. The term "vaporware" became more than a joke as a result of Ovation; the investment community learned cruelly that the easy money era of the industry was over; the young founders discovered that the industry is a lot more forgiving of experienced veterans who fail than newcomers; and PC analysts heard the door slam shut on a five-year boom that ended in 1984. Ovation was one of the last companies glimpsed on the far side of that door—an unnerving tribute to all that might have been and wasn't. Brrr.

For hobgoblins, I'd have to nominate the venture capital community as the most bedeviling—but it's a matter of structure, not the will or wishes of those who practice the art. Thanks to a remake of pension fund rules in the late 1970s, the amount of money in venture funds increased close to tenfold in a matter of a few years. With all that money chasing a relatively fixed number of good deals, a lot of bad deals got made.

Perhaps the worst example is the disk drive business. In the early 1980s scores of companies coagulated out of the primordial goo to strike it rich in making storage devices for all those personal computers the market forecasters said would be shipped. The state of the art got advanced, all right, but so did the state of competition. Prices fell, margins evapor-

ated, and manufacturing capacity grew faster than demand. It's still going on. According to Dataquest, there's capacity now to build 17 million drives—against a 1988 demand for 14 million.

Who's your candidate for Warlock of the Year? Mine is Ken Olsen, chief executive of Digital Equipment Corp. Whether you consider his magic black or white, he's managed to ink what sometimes look like contradictory deals with almost every major player in the business.

"My candidate for warlock of the year is DEC's Ken Olsen."

Apple Computer Inc. and Digital are building joint Apple/DEC-Net interfaces, Compaq and Digital are developing VAX-to-MS-DOS linkages, Digital was supposed to sell Olivetti PCs in Europe, and now Digital will be reselling Tandy PCs under the DEC nameplate. For that matter, Digital is aligned with archival IBM in support of both Unix (the Open Systems Foundation) and the Microsoft OS/2 LAN Manager. It could not all be done with mirrors. Olsen must have some

unnatural powers working for him.

In the gargoyle, or stationary menace, category, should we talk of IBM or of Japan Inc.? Or both? Both are fixtures along Tech Street and both have the capability to topple onto passersby below. IBM, as it muddles along as a player and fragments the market as much as possible—the better to get market share in the choice fragments—does little to calm nerves on Tech Street. Will OS/2 make it? And will the industry be advanced or hindered if it does or doesn't? Why is the future so murky, its portals so shrouded? And those Japanese, holding the keys to low-priced manufacturing and to the semiconductor memory business—are they smiling benignly on their lofty comices? Or is that a different, more inscrutable look? And what about that two-stroke engine noise?

Tough to tell from here, under the covers. It might be Steven Jobs, coming to do a number on the business, but I can't tell if he's got a chainsaw or a 500cc Honda moped. Better wait till morning to investigate.

Say, what's that noise on the window pane? We're not expecting any clandestine visitors are we?

What the . . . ?

John Gantz is editor of the Tech Street journal, a newsletter on the high-tech stock market and business performance. The views expressed are his own.

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PERSPECTIVES



ORCHESTRATING WORK TEAMS

BY PAUL SAFFO

An odd new word — *groupware* — is on the loose in the computer industry. It's splashed across editorial pages, overheard at conferences, promoted by marketers, and debated by pundits. But what is groupware, anyway? A new computing concept? A novel product category? Or simply the latest in Silicon Valley hyperbole? The short answer is a bit of all three, and something more besides.

Groupware refers to a vision of computer aids designed to support business teams. It's more than just software: It includes hardware, organizational theory, and even professional services. Groupware has been most closely associated with so-called "high-performance teams" — small, elite workgroups with unique missions and tight deadlines — but it's equally appropriate for large groups of workers performing routine tasks.

This vision is expansive to say the least. Virtually every office task from phone tag to writing memos has a group dimension and is a candidate for groupware. It's also a vision that has been around for some time.

SUPPORTING BUSINESS TEAMS. Attempts to use computers for group applications date back to the early 1960s, when a team assembled by Doug Engelbart at Stanford

Business demands and technological breakthroughs make the time right for groupware, but the effect these products will have on the way people work is still open to question.

Research Institute began work on a system to provide communications and support for high-performance teams. Called Augment, the system allowed teams to perform many groupware functions, such as conferencing, group writing, calendaring, and project coordination.

Not only has the philosophy behind groupware been around for a while, even the term groupware is not new. It first appeared around 1980, probably coined by researchers Trudy and Peter Johnson-Lenz. Over the years its usage gradually mutated in the academic literature alongside a baker's dozen of similar terms: workshop computing, collaborative computing, interpersonal computing, group decision support systems, and group augmentation, to name a few. Groupware has never been a popular

term with academics (to this day, most researchers prefer the more cerebral-sounding phrase "computer-supported cooperative work"), but it has the advantage of being short and catchy — just the right thing for the rest of us.

If groupware has been around for so long, why the sudden interest outside of the research lab? For starters, the technologies that make basic groupware products possible are just beginning to fall into place. Many groupware products will require a local area network for communications, as well as the power and flexibility of new workstations for acceptable performance.

At the same time, the business need for new approaches to team support is becoming acute. Economist Peter Drucker has noted a fundamental change in leading corporations today: Traditional

command-and-control structures are eroding as managers discover that corporate success is increasingly dependent upon the activities of informal, task-oriented business teams. Drucker believes corporations will eventually resemble orchestras — a set of autonomous professional teams coordinated by a "conductor." Management by hierarchy is giving way to management by "ad-hocracy" as executives struggle to find ways to nurture and coordinate these new business teams within overall corporate goals. Good groupware products could go a long way toward aiding this process. In fact, there are already a few early success stories in the construction and aerospace industries where team-oriented management structures have long been the norm.

CLASSIFYING PRODUCTS. Groupware products today can be divided into three categories: "true" groupware, products with groupware dimensions, and groupware platforms and environments. True groupware is like a telephone — it must be used by at least two people to be used at all. Typically, true groupware is sold only in multiple copies.

True groupware products have grabbed most of the headlines to date. Because personal computing is just about the last solitary office activity, the introduction of group computer tools struck users and the press alike as an exotic

innovation. Often these products simply simulate a process already conducted on paper. For example, For Comment, a group writing tool from Broderbund, allows a team to electronically review and annotate a document on-line, automatically organizing the annotations for the convenience of the original author.

The second category — products with groupware dimensions — encompasses products that can be used by one person, but also have value to a group. Decision Pad from Apian Software is an example. Designed as a single-user decision support tool, Decision Pad is finding growing use by small groups of decision makers huddled around a common screen or computer display. Some of the most intriguing products in this category are games, such as Macromind's Mazewars or Sphere's Falcon. Both can be played by a single user, but they take on a whole new dimension when a group is involved.

At the moment, true groupware prod-

ucts outnumber and overshadow products in the second category, but this will change in the next few years. True groupware likely will become a large niche market, and products with groupware dimensions will become the big sellers. The reason is simple human nature: True group products require a group purchase decision, which involves both time and hassle. Of course, the software can be purchased by a fiat of senior management, but that is hardly a factor for team-building success. It takes an average of six months for companies to decide on a groupware purchase, and an unknown number never get around to buying the product. This group-purchase hurdle has been a real problem for many groupware start-ups. Despite the attention given to their products, actual sales volumes are modest, and profitability is often elusive for these firms.

By contrast, purchasing products with groupware dimensions remains an indi-

vidual decision. Imagine a conventional word processor that includes the groupware features of For Comment — a single user could purchase it for personal use. Then, as others in the organization purchased copies, a work team could begin to explore the group functions. This process nicely matches both current purchase patterns and the ad hoc nature of most business teams. And from a developer's perspective, the groupware features cease to be a block and may even create an incentive for follow-on sales.

Another factor in favor of the second category is the tendency of groupware products to build on tasks already performed by individual users — such as a developer's perspective, the groupware features cease to be a block and may even create an incentive for follow-on sales.

HEAVY DEMANDS. The third category,

groupware platforms and environments, is at once the most and least developed of the three. It is most developed because the recent availability of basic platforms such as LANs and powerful PCs made the sale of early groupware products possible. But platforms and environments are also the least developed because all but the simplest groupware products will require more computing horsepower and deeper applications integration than is available today. For example, Coordination Technology Inc., which is doing some of the most interesting work on coordination-based groupware, abandoned plans to develop its product for DOS, electing to go directly to an OS/2 environment.

Even new systems such as 386-based computers and the Mac II may fall just short of meeting groupware needs. Personal computers were a bit hit because even a small amount of power on one's desk meant better performance than time sharing on some remote system. Loading

TWO TAKES ON WORKGROUP COMPUTING

Letting Workers Coordinate Their Group Efforts

BY DAVID J. BUEHRER

Groupware is more than just software used by people in a workgroup. It's an attitude, central to the success of companies in the information age, that will change the way we use computers to do business.

The hype that pervades the computer industry makes it easy to dismiss groupware as a short-term marketing ploy. Indeed, few of the existing "official" groupware packages do little to stir one's imagination or foster much enthusiasm. There's a danger, though, in letting the state of current products shape our opinion of groupware as a whole.

Mainframe users have enjoyed electronic mail and scheduling software for years, yet the introduction of such products for personal computers has triggered a good deal of controversy. In the midst of all the excitement, one wonders what's so objectionable about software that can help people work more effectively and cooperatively.

One catalyst that is focusing attention on groupware is the local area network. The typical LAN is relatively small — perhaps a half-dozen PCs or so — and used by members of a common workgroup. As years of using LANs, people are looking for new ways to use networks to further business goals. Groupware software is an obvious candidate.

BRINGING PEOPLE TOGETHER. Workgroups are the modern production vehicle for bringing innovation to life. In traditional hierarchical organizations, groups often bring together people with diverse talents from different departments with different bosses. Rapid change is the norm today, and workgroups are vital to keeping up with this pace since horizontal problem solving leads to quicker, more informed decisions.

But a workgroup's diversity in both talent and reporting paths also poses unique challenges. Its most vital need is constant, clear communication about who is doing what, when, where, why, and how. Groupware squarely meets this requirement by helping to organize and



control cooperative tasks. Some of the most obvious uses are managing telephone messages, scheduling meetings and conference rooms, planning projects, juggling resources, tracking who's done what, delegating tasks to reviewing vendor and contact lists, and managing local and wide area E-Mail. The truly revolutionary uses of groupware, though, will only become clear as the product category matures and users have a chance to experiment with the software.

MAKING A COMMITMENT. Although a president or high-level manager can mandate the use of group-oriented software, unless all group members agree to fully utilize the program, its success is limited. This commitment may reach beyond what is primarily required to a workgroup, and such major attitude changes take time.

The level of commitment required for groupware presupposes that a group truly needs the software. If communication efforts are best met with groupware, the effort is worthwhile. Otherwise, it's a waste of time and money.

Groupware critics often argue that such packages only serve to impose external controls and restrictions on individual freedoms and activities. These fears are unfounded, however. Groupware isn't designed as a tool for top management to limit autonomy over the daily activities of employees. It's a productivity tool for small work teams, whose members typically have no authority over one another.

Groupware is a concept that requires commitment, but it also offers great communication benefits to small, cohesive workgroups. It offers the potential for a substantial improvement to the way people work by giving small groups the tools to control their work, and not let the work control them. □

David J. Buehrer is executive editor of connectivity and testing at InfoWorld.

External Control Key to Current Crop of Products

BY DON CRABB

I introduce it with fanfare. Hey, it's oversold. It. Then let the columnists fight over it. Such is the capsule history of workgroup computing. We're talking the hot topic now in computing. So much heat, but sadly, so little light.

Groupware computing takes the decades-old group computing concept, refines it, and applies it to PCs and LANs. Not, in itself, a bad idea. Who doesn't want to share information transparently and work better with one's colleagues?

But the current crop of programs falling under the workgroup rubric leaves much to be desired. They take the simple idea of workgroup computing — the sharing of information, ideas, partially completed work, and group schedules and calendars — and emphasize the aspects of control that such sharing schemes spawn. As it stands, workgroup computing equals much to be desired. They take the simple idea of workgroup computing — the sharing of information, ideas, partially completed work, and group schedules and calendars — and emphasize the aspects of control that such sharing schemes spawn.

JOINED AT THE HIP. To date, despite plenty of academic and commercial research into workgroup computing (the MIT Center for Information Systems Research has been particularly active), nobody has consistently made the case that electronically linked groups foster better individual performance, improve group dynamics, or speed up the completion of tasks.

The problem can often be reduced to the people involved. Some individuals may work well when they are electronically joined at the hip with other members of their workgroup. Others function poorly in this situation, because they don't find electronic interactions satisfying or completely motivating, or they lack sufficient nuance. When you organize projects primarily over computer networks you depersonalize the process. No amount of jazzy E-Mail graphics, shared calendars, or explicit commitment demands can fill this void. Human beings interact on so many levels that we can't begin to



systematize these interactions.

Besides these fundamental concerns, the biggest problem with the workgroup concept is that it's been oversold. The really creative workgroup software — the stuff that will blow us away with its new orientations — hasn't hit the market yet.

Instead, the promise of workgroup computing has been substituted for available software. While we wait for the first generation of true groupware, we're stuck with older products that only emphasize the control of simple communication among group participants. By lowering our expectations, these current products may even damage the future market for more advanced programs.

A look at one of the current workgroup packages. The Coordinator by Action Systems, Illinois, is a good example. The Coordinator works like an E-Mail system for workgroups but goes way beyond simple messaging. It's actually a fairly elaborate, sophisticated, and rigid E-Mail conferencing system that keeps the idea of project control at the forefront. The whole idea behind it can be summed up in two words: explicit commitments.

BESTAPO-LIKE. And the problem is not restricted to this piece of software. It's shared by other packages. Workgroup software may be the next great breakthrough in microcomputing. Or it may be a dud. Right now, we just don't know, because the first real workgroup software won't appear until at least 1989. Let's hope that it offers some genuinely new and useful paradigms for sharing micros. It would be a shame if the gestapo-like programs we've seen so far are the software ever spawned by the concept of workgroup computing. □

Don Crabb is the director of laboratories and a senior lecturer for the department of computer science at the University of Chicago. He's also a contributing editor to InfoWorld.

down today's PCs with processor-hungry groupware products may amount to a performance throwback to mainframe days.

More powerful systems are in the works, but success will also require new foundational approaches tailored to groupware needs. One likely leader in this area is Mitch Kapor's On Technology, which is reportedly developing an infrastructure that will be midway between an application and an operating system, providing the communications and data support required for advanced groupware products. Other pieces in the infrastructure puzzle include shared database schemes such as SQL, object management, models applications, and versatile output such as Display Postscript. Next Inc.'s new machine could be the best platform yet, but it won't be generally available to business users in the next few years.

AN AWKWARD ADOLESCENCE. Because of the tremendous technological requirements, the shape of the platform category won't become clear (much less complete) before 1990. In the meantime, users seeking to exploit groupware products may be frustrated by performance limitations. They'll have to settle for small wins, like the effective use of products with basic groupware functions such as group E-Mail and group calendaring.

The uncertainty and surprise inherent in the future of groupware goes beyond hardware performance and infrastructure. A key challenge is understanding the complex, messy world of human interactions with sufficient clarity to develop products that actually meet business needs. This won't happen overnight, and in the meantime we're likely to experience a performance gap as many intriguing products fall short of working as advertised.

Groupware as a product category is off to a quick start, but it is headed for a long and awkward adolescence as users and developers alike discover what works and what doesn't. The slack will have to be taken up by users willing to adapt their behavior to the new products as the price of realizing groupware benefits.

THE GROUPWARE CHALLENGE. This need for behavioral change can be organizational dynamic. Change is possible — especially with cohesive workgroups — but can be wrenching, even when it is well-planned. The Coordinator, Active Technologies' mail system, has gained some notoriety in this regard because users must understand and conform to a set of highly structured conversational principles established by the company's founder, Fernando Flores. The product enjoys a core of enthusiastic users, but a few dramatic success stories, but others have reacted with hostility, labeling the product "fascist" software. Future groupware products may also spark fears of an electronic "big brother" and raise the specter of the office as an electronic sweatshop. The bulk of groupware products to date has been targeted for high-performance teams that enjoy a large degree of autonomy and deal with constantly changing tasks. Supervision is rarely an issue for such groups. But what about less elite workers engaged in routine repetitive tasks? If groupware can automate the bridge of the corporate information ship, it can also automate the boiler room.

It is easy to imagine systems imposed on clerical workers that track employee performance by the number of documents processed or keystrokes per hour. The potential for abuse is quite real,

judging from recent experience with operator automation in telephone companies and airline reservation systems. Such a pessimistic future is not inevitable, but the new technologies create potentials for abuse that will require vigilance by civil libertarians.

Even if the dark side of groupware never materializes, poorly designed or carelessly used products could become a menace to individual productivity. Less gregarious employees may be particularly unhappy. One hotshot designer at a major research lab, for example, recently complained about peer pressure to respond to messages on the center's conferencing system. "I don't care about

interacting with other people," he said, "I just want to work in peace." His comments may seem anti-social, but he's onto something. In their rush to make the PC an interpersonal computer, groupware proponents have to be careful not to let the process take precedence over the ultimate goal — better organized companies making better business decisions.

Ultimately the importance of groupware is as a new way of thinking about computing. Like the terms user-friendly and hypermedia, groupware is likely to become a rallying cry for users and a Rorschach blot of the hopes and fears of optimists and pessimists alike. As with earlier revolutions, it will be a time of

both opportunity and deep ambiguity, punctuated by the hyperbole of enthusiasts and the cautious pessimism of groupware skeptics.

Making sense of groupware in this environment will be a challenge for users. Success will lie in approaching groupware as a new way of working, rather than simply the latest item on one's software purchase list. □

Paul Safto is a research fellow at Institute For the Future, in Menlo Park, California, and a contributor to the book Groupware — Computer Support for Business Teams, published by the Free Press.

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TO THE EDITOR

A Very Long Eight Seconds

I read Jeff Angus' column "Speed Doesn't Kill, But Then Neither Does the Lack of It" (October 17) with some amusement. While Mr. Angus is probably right in his extrinsic calculations of pennies saved in employee time on a fast word processor vs. dollars spent for that word processor, he overlooks the rather obvious and doesn't seem to address the intrinsic considerations that waiting eight or however many seconds in midstream while working on a computer always seems to be a very long eight seconds, and b) is an annoying interruption. To be writing in a word processor and having to thump fingers on the side of the keyboard while waiting every time I want the program to do something is not what I care to encounter while I'm working.

Mr. Angus selects a few word processing benchmarks (jumping to the end of a document, deleting characters, search/replace) as criteria for his calculations. However, my experience has been that if a few features are inordinately slow, in all likelihood most, if not all, of the rest of the program is going to be inordinately slow as well. So while he calculates pennies saved (or lost), how about how long it may take to perform intermittent saves, call up a synonym, spell check, reformat, sort or renumber a list, repaginate before printing, and so on? And everything into the cost of using the slower software, not just a few benchmarks. Then he should consider the human being who is sitting there at his computer waiting, however few seconds (but waiting), through all this, and he might find more than pennies saved by spending more for a faster word processor. You might find a more useful answer rather than grumbling through a program, an intrinsic consideration that can be measured only in terms of the quality of output, not quantity.

My experience has been that people work better on the faster software.

Bob Brody
Los Angeles

Jeff Angus replies: Mr. Brody has some good points about the frustration of waiting, and his framing of those arguments is indicative of his point of view. He says, "waiting eight or however many seconds in midstream while working on a computer is always going to be a very long eight seconds, and b) is an annoying interruption." Well, he is certainly right.

But the sad fact is that Mr. Brody is not really more annoyed with his eight-second wait than he is with the five-second wait. The faster the computer provides. Once it goes beyond about three seconds for the experienced computer user, frustration is reached.

The truth is, most secretarial word processing users, the user category on which workplace productivity most hinges, aren't frustrated with word processing compared to typing. As our man Einstein stated, time is relative, and the wait that makes Brody's Anguses go Type A-excessive is imperceptible to the vast majority of office workers who live with time as defined by work accomplished, not by the speed of their computer's tools.

For businesses to be productive, we have to keep feelings about perceived time subsumed to what work gets done and when — content over form.

Who-What-When vs. Agenda

I was reading William Zachmann's column with the headline "PIM Software Can't Compare With Basic Products in Broad User Acceptance" (August 29). His points are well-taken. Who in his right mind wants software so complex that it requires a "Ph.D. in computer science" just to use it? However, there are some striking errors in his column.

Zachmann lumps Chronos' Who-What-When with Lotus' Agenda as examples of "sophisticated PIM software", despite the fact that they're on opposite ends of the spectrum. Who-What-When is a simply structured management tool,

whereas Agenda is an unstructured database.

PIMs are typically described as imitating the way that our minds work. But is this necessarily a good thing? Whoever said that the more complex and creative your mind is, the more incredibly complex your software needs to be? And guess where the structure went when it came to using unstructured databases? It's right there in your already overburdened brain. And therein lies the point of it all:

Busy people don't have time to learn how to use an unstructured database. However, reviewers ranging from Michael Miller to John Dvorak to TV's "The Computer Show" all describe Who-What-When as being "simple", "elegant", "easy to learn", and having a "10-minute learning curve." How can Zachmann critically compare Who-What-When to Agenda — a product you never stop learning how to use?

Who-What-When offers a simply structured approach because structure equals organization. We believe that the more complex your mind is, the more you need a simple tool to work with. Simple is powerful.

Stanley Ariet
Executive Vice President
Chronos Software Inc.
San Francisco

Correction

The telephone number for DTG Inc. of El Toro, California, developer of System Sleuth, was listed incorrectly in the October 17 issue ("DTG Introduces System Sleuth Utility," Page 26). The correct phone number is (213) 987-2000.

Please write to Letters, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025 (MCI Mail: 259-4127; Compuserve: 73267,1537; or The Source: TCX939). Include your name, address, and daytime telephone number. Letters selected for publication will be edited for length and clarity.

RESOURCES

November 1-3, Anaheim, CA: The Macintosh Business Conference & Exposition will give buyers the chance to evaluate Apple's Macintosh business solutions. Location: Disneyland Hotel and Convention Center. Contacts: Cambridge Marketing Inc., (617) 860-7100; Germain DRK Inc., (617) 542-5883.

November 2-4, Monterey, CA: CASE Research Corp.'s Annual CASE User Conference will focus on actual user experiences. It will feature speakers on the theme "Managing the Transition to CASE." Location: Doubletree Hotel at Fisherman's Wharf. Fee: \$795. Contact: Paul Berkshire, CASE Research Corp., 155 108th Ave. N.E., Suite 210, Bellevue, WA 98004; (206) 453-9900.

November 8-10, Philadelphia: The Association for the Development of Computer-Based Instructional Systems will host its 30th annual international conference on the use of computers in training and education. Over 400 presenters representing government, private industry, and elementary, secondary, and post-secondary education will take part. Full-day pre-conference workshop on November 7. Contact: ADCIS, 409 Miller Hall, West-

ern Washington University, Bellingham, WA 98225; (206) 876-2860.

November 9-11, Boston: AT&T and Sun Microsystems will hold Unix System V, Release 4.0 Software Developer Conferences in several cities this fall. The three-day conferences are designed to provide technical information on the key features of Release 4.0. Conferences will also be held in Chicago, San Francisco, and Washington. For registration or more information call (800) 247-1212.

November 9, Chicago: The Chicago Association of Microcomputer Professionals (CAMP) is holding its Seventh Conference/Vendor Fair. The keynote speaker for the fair will be Microsoft chairman Bill Gates. Contact: CAMP, P.O. Box 380, Deerfield, IL 60015-0380; (312) 831-0286.

November 10-11, Boston: Gen2 Ventures is conducting a seminar on SAA, IBM's strategy for bringing cross-system consistency and application portability across all its systems lines. Contact: Gen2 Ventures, (408) 446-2277. Cost: \$795 per person with multiple attendee discounts available.

November 10-12, Boston: "Standards and the Desktop" is a conference designed to explore the range and power of the international Standard Generalized Markup Language for text and graphics. Location: Hotel Meridian. Fee: GCA member, \$495; NADTP member, \$590; nonmember, \$685. Contact: Graphic Communications Association, 1730 N. Lynn St., Suite 404, Arlington, VA 22209-2085; (703) 641-8160.

January 17-19, New York City: An annual Computer Graphics Show will exhibit hardware, software, and services. Location: Jacob K. Javits Convention Center. Contact: David J. Small, Exhibition Marketing & Management, 8300 Greensboro Drive, Suite 1110, McLean, VA 22102; (703) 893-4545.

InfoWorld welcomes notices of national conferences, trade shows, and meeting schedules. Write to: Computer processing, MIS, information center, and microcomputer management associations or support groups. Send notices to Resources, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025. No local training or education seminars, please.



RIDING THE FOURTH WAVE ■ BY JEFF ANGUS

Next Developers Will Be Working in Galapagos-like Isolation

Last week I intentionally left unanswered the question of how we would end up developing the software that would make Next Inc. workstation competitors in the business arena.

Since I already explained the logic behind why it won't be the existing Unix community, the dominant developers, or even the small innovative shops that produce Mac or DOS applications, who does that leave?

The Galapagos lizards.

The business programs will end up being developed by the college kids who will cut their Unix teeth on the Next machine. Its bundled languages will be the ones they're imprinted with, the ones they think in, and the ones they will most naturally want to develop programs in.

The machine has some consumer hooks in it, like the squeeze in Charmin or the lemon scent in Sunlight. Next has megapixel graphics, CD sound, and Museum of Modern Art box design—all engineered to appeal to the consumer-oriented subgeneration: late adolescents.

Both computer science grad students and students in other areas who see their faculty playing with these systems are going to be sucked into the Next ethos like 3-year-olds into Nintendo. They're going to want to master them and make them sing.

This urge, however, is going to happen outside the mainstream of business computing.

Next developers will be isolated, like Galapagos lizards, from the Unix society. And the product distribution issue assures complete separation. Because the least expensive removable media for Next is the \$50 erasable optical disc, vendors aren't going to sell \$99 desktop utilities for the system.

Next vendors are going to have to revamp distribution, making it electronic for paid downloading of applications. The most economic form of distribution will be a phone-in service where buyers provide a credit card and get a password to download from a bulletin board. More predominant than that, distribution will be internal—within Next-centered organizations.

Programs will be distributed broadly within the developing organization, either through networks or passed-around media. Each application will be refined not as a commercial effort, but as a research project. And these Galapagos products won't be built to thrive in the larger world of business.

The Next machine, restricted by the company's declared sales policy and the lack of apparent business revenue to be won, will surely be a "Galapagos island"—distant from the rest of business computing. That continent is populated with all the organisms currently struggling for survival, but this Next/Galapagos island has none of the continental predators who stomp out emerging life forms to protect their turf and shape their environment.

The college kids' computer talents will evolve, like Galapagos lizards, into uncommon organisms with their own un-

common sets of behavior and standards. When you do see a product for the Next machine, it will shock and disorient you, because the society of kids that learn on it won't know anything about the old Unix culture, and may not even have many cognates from the DOS culture. They will be children of Next, and it will be exciting to see their products.

Will these academic computer whizzes have brilliant stuff for real-world business

computing buyers?

I think it will be worth looking into. I think they will try to create solutions that no one else is working on. Still, it's a long way off. In case it hasn't been made clear, Next won't be part of your purchasing questions until about the second quarter of 1991—all the protests from the traditional Unix developers to the contrary.

Unix on the Next machine will have

become merely an agar dish for breeding a mutant operating system, and the old Unix culture, as well as the performance it promised, will recede into the horizon.

This column is intended as a forum for the real heroes and heroines of the computer industry—the men and women who install and support the applications that make work more productive. Contact us by mail, or MCI Mail: jangus.

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AUSER'S VIEW ■ BY JERRY POURNELLE

Is Next's Lack of a Floppy Based on Religion or Economics?

After all the hoopla about Steve Jobs' Next computer one might have expected much the same thing, but in fact the Next is an impressive box.

Everyone has described what it is, so I leave you to add details. It's a big Unix box with lots of trimmings, clearly designed to compete with the Sun.

There's no floppy and no hard disk; instead there's a read/write optical drive with removable media. It's very much designed for networking and electronic communications in general.

Steve Jobs has said that he wants his Next to "raise the least common denominator," meaning that he wants to force a quantum jump in what kind of machine the user expects and will put up with. This is a sentiment that I thoroughly agree with.

The question is whether users will pay the price for that increased expectation.

Apple's Macintosh has done something of the sort, but it had to do it the long way, because the Mac costs so much; it would have been more the computer for the rest of us if all the rest of us could afford one. Anyway, I wish Jobs well at that part of his endeavor.

A MATTER OF TRUST. Some concerns come to mind. First, I'm not sure I'd trust all my work to a read/write optical drive with removable media and no backup system. True, I have considerable confidence in the WORMs I have, both Maximum Storage and ISI WORMs and they're wonderful; but even now I put critical work onto floppies in addition to WORM.

Then, too, WORM drives have been around long enough that I have some data to back my confidence on. Not so with read/write opticals.

I may be foolish, but I recall when removable hard disk cartridges first came out. It looked like a wonderful idea, but it turned out there was a problem with spindle wear, and a lot of people lost data when the removable hard disks became unreadable after a year or so.

I also wonder about the lack of a floppy disk drive. My sources tell me it wouldn't cost more than \$40 for Next to have added a high-density 3½-inch drive; that works out between \$100 and \$200 more on the list price, at least according to the conventional wisdom.

However, I question the conventional pricing strategy. While it's true that if you're going to make a profit you have to sell for at least twice your manufacturing costs (and more if you're trying to impress investment managers), it is not true that you have to apply that multiplier to everything in the box. As an example, assume you have a machine that you're selling for \$6,000. If you're selling all you can make, you don't have a problem; but if the lack of a \$40 part is slowing sales, you can either eat the \$40 cost, add \$40 to the sale price, or break even, add \$100 to the sale price.

This will increase your profit on units sold, but also up the price of your system and possibly hurt sales.

Every one of those decisions can be justified, at least to anyone other than a Harvard MBA, and they haven't man-

aged to figure out how to look past next week anyway.

DIVIDE AND CONQUER. I could be wrong, but I suspect the lack of a floppy on the Next is more a religious decision than an economic one.

Jobs, after all, brought us the 128K one-floppy no-hard-disk never-to-be-modified-or-upgraded Macintosh. When asked by Next developers about floppies, Jobs headed straight for obscenity. He mumbled something about bold new philosophies and the like.

The reason this concerns me is that it could be yet one more attempt to divide the computer revolution. It has always been traditional for mainframe and big minicomputer makers to fence off their customers and isolate them from each other; IBM software won't run on DEC machines, which keeps the software sales volume low and in theory justifies astronomical software prices. That strategy hasn't worked well in the micro environment.

Apple has managed to keep its users away from the IBM-compatible world, but then Apple has been around long enough that there was, for a while, some question of whether Apple wasn't the

ware developers.

IF IT WORKS, KEEP IT. Then, too, one reason people aren't so anxious to throw away their old equipment is memory costs. If you've invested in memory boards at today's memory chip prices, you'd as soon get some use out of them; meaning you're not quite so anxious to go to a new bus and buy new add-on cards.

It's ironic, of course. Since IBM makes its own memory chips, the U.S. Department of (No) Commerce memory-chip cartel did help IBM in its war against done makers by running the systems prices up. Now that's hurting micro channel. It just goes to show that interfering with free markets often has unexpected effects. I wish they'd stop doing that.

From my viewpoint it's just as well that we get to keep the old PC AT bus for a while longer, since I'm just getting things set up the way I want them. What I have is an XT clone from Sterling Solution. It's dedicated to communications: the Complete PC Answering Machine and the new Intel Connection Coprocessor. Both of these have on-board processors; the Intel board has an 80186 that runs much faster than the XT clone's

"The Next machine has a lot going for it, but if its marketing strategy is indeed driven by the desire to fence off its users from the rest of the computer world, it will turn out to have been a mouse after all."

mainstream and the CP/M S-100 systems the offshoot; it took IBM's entry into the PC world to settle that issue.

The Next machine has a lot going for it, but if its marketing strategy is indeed driven by the desire to fence off its users from the rest of the computer world, it will turn out to have been a mouse after all.

IBM'S MICRO CHANNEL STRATEGY. On that subject: When IBM first came out with the Micro Channel Architecture bus I confess I liked it a lot. I thought the industry was ready for a new standard bus that wouldn't have some of the problems of the standard AT bus encountered at high clock speeds. It looked as if IBM had stepped out front as the industry leader once again.

It didn't work out that way, largely because IBM didn't want it to. Big Blue and the discouraged industry adoption, with its licensing policies; they even asked for retroactive fees from anyone who had used the PC and AT bus structure. Big Blue's leaders apparently decided that IBM had enough marketing clout to get people to buy Micro Channel under the IBM name.

It's understandable, of course. IBM has been gnashing its teeth over the clone makers' market share, and hoped to take care of that with Micro Channel and the new licensing policies. Alas, it doesn't seem to have worked. There has been no rush of third-party Micro Channel hard-

8086.

This machine is networked with Artisoft's LanTastic to several other machines. The result is that I can use the net to get my electronic mail.

The Intel board is more a curiosity than useful just at the moment. It's good at talking to other Intel Coprocessors at 9,600 bits, and so far I don't know anyone else who has one. It would be great for a company that has a number of offices in different locations.

Also, it will send and receive fax messages, and Intel advertises but didn't send me a 2,400-bps modem that can plug/bay on the Coprocessor. What's next about the board is that it can be programmed to call up any number in its phone book at whatever time you specify; it can send messages; and it can grab any that it can find.

Since it's running on its own 80186, it doesn't use the XT, so it's free to serve the network and the Complete PC Answering machine (which will soon have its own phone line). I'm only just getting started with this, but I don't anticipate any problems.

The next step is to set up a generic clone AT with a Maximum Storage Systems WORM drive and an Amdek Laserdek CD ROM reader, and connect that machine up in the LanTastic net. I know that will work because I've done it before.

The advantage here is that the memory-resident part of the WORM drive

software and the Microsoft DOS extensions to access CD ROM only have to be in the generic clone; that way I keep my big Cheebat 386 with clear memory except for the relatively small resident code that LanTastic wants. LanTastic can get away with this because its boards also have a coprocessor, in this case a Z-80. Thus it doesn't steal CPU cycles, and most of its program is in its own on-board ROM.

The really neat part is that the Amdek Laserdeks can be daisy-chained so that I can have two different CD-ROM discs online at all times. For the moment those are the Microsoft Bookshelf and the McGraw-Hill Encyclopedia of Science and Technology. I can access either one of them from here.

And I haven't quite got this setup working with Desqview yet. I don't have any trouble accessing the networked WORM in a Desqview window, but there do seem to be some difficulties with the CD ROM on the network. I expect that I'll get it all straightened out one of these days. Meanwhile, I'm just as glad not to be changing bus architecture just as I'm getting things set up right.

A LIST OF UTILITIES. I'm finishing up my new book, *The Chaos Manor Guide to Easy DOS Computing* (Brady, Simon and Schuster, Real Soon Now) and I've been writing the chapter on useful—even vital—utilities.

I'm sure I'm not through with the list, and already I'm amazed at how many there are. They come in two categories: those I use every day or so, and those I seldom use but find vital when needed.

Among the utilities I use the first category are: Norton Utilities; Golden Bow WOPF and that other quDOS, QDOS and Norton Commander (I don't really need both, but I'd hate not to have at least one of them); and Borland International's Sidekick (I expect I'll get around to using Sidekick Plus one of these days, but I find old Sidekick itself good enough, and I'm used to it).

There are also Grandview and Desqview, which aren't precisely utilities, but used together they act like one: With Grandview in a Desqview window it's so easy to make notes that I no longer lose ideas when I'm working on something else. Really, it's wonderful.

In the "you'd better have these" category are Maca Utilities; Steve Gibson's Spin Rite, which is plain wonderful (as long as you don't have a Priam ESDI hard disk); Gopher (which you may want to look in the "tools for hackers" category); Deft, depending on how often you find yourself wishing you knew where you'd put certain files; CPYAT2PC, which lets high-density AT drives write disks readable by PCs with 360K floppies; and Xenocopy, which takes files from folders in the target machine to the IBM and Wang and Micropolis and reads them into your PC.

A few months ago I'd have put Fastback in this list, but now that I have a WORM drive, I don't use it any more. If you don't have a WORM, you probably need Fastback.

I'm still working on the list, and I'm sure there will be a bunch more; meanwhile, I swear by all these.

Jerry Pournelle is a noted science fiction writer and computer columnist. The views expressed are his own.

PRODUCT COMPARISON

PORTABLE COMPUTERS EXPAND THEIR NICHE

PRODUCTS REVIEWED

Compaq Portable 386.....	50
Dolch 386 Pack.....	51
Micro Express Regal II.....	53
Scantech LCD-386.....	54
Compaq Portable III.....	54
Micro Express Regal.....	55
Micro Telesis SX.....	55
Sharp PC-7241.....	58
InfoWorld Report Cards.....	58, 59
Executive Summary.....	59

These "lunch box" luggables perform a key role, offering expandability for RAM and add-ins, larger hard drives, and improved displays.

Fondly referred to as "luggables" and "lunch box" computers, portable systems are carving a strong market niche for themselves. With their increased power and capacity, along with competitive pricing, portables meet market needs that laptops and larger systems can't.

We tested four 386 and four 286 portables. Compaq and Micro Express have one machine in each category.

What distinguishes the lunch box computers from their smaller cousins is more than just the case. Portables have far greater flexibility for expansion. Most have at least one free expansion slot on the motherboard and often offer an additional expansion chassis with approximately four slots. Portables can accommodate larger hard drives, with some vendors already offering a range of drives from 20 to 170 megabytes. Additional flexibility comes in RAM. Because of their expansion slots, portables are not limited to the amount of RAM available on a motherboard. All of the 386 machines and many of the 286s come standard with a memory board in one slot. All four of the 386 machines can be loaded with up to 10 megabytes of RAM.

Video technology advances are destroying the old display stereotypes for these smaller machines. With the entrance of gas plasma and electroluminescent screens, these systems are now more viable for extended use or product demonstrations. Of course, they all can be connected to external monitors, and some now emulate EGA, allowing clearer graphics.

On top of all their technological plusses, portables are also fighting the battle of the budget. While the 386 systems topped out at a whopping \$8,999 (Scantech LCD-386), there are some jumping in at around \$4,000 (Micro Express Regal II). The 286 systems are even more affordable, with the current low-price champion at \$1,899 (Micro Telesis SX). As more clones begin to enter the market, expect prices to be driven close to or below full-size systems.

All of the units we tested fit within the legal FAA standard for carry-on luggage. The average weight is 21 pounds, and all come with padded carrying cases.

BY DAVID CHALMERS
AND SALLY J. DOUGLAS
INFOWORLD TEST CENTER



386 PORTABLES



Compaq

PORTABLE 386, MODEL 40

One of the first manufacturers to introduce a portable 386, Compaq is now several reviews deep in its portable line. The Portable 386 and the Portable III (see following review) are the current cream of the crop from Houston's computer success story. Not surprisingly, this computer was among the most expensive that we tested.

The 386 is an 80386-based computer

running at a 20-MHz clock speed. It has a plasma display that emulates a CGA display. Text is very easy to read, but color graphics have little contrast and are difficult to discern on the monitor. Software should be installed using a monochrome setting. A single serial and parallel port are present along with a nine-pin external monitor output.

The unit we tested also had an internal modem installed (A 2400-bps modem costs \$349; a 2400-bps modem is \$599). We tested the standard machine, which carries a high-density 5¼-inch floppy along with a 40-megabyte hard disk. The standard memory is 1 megabyte; our unit had 2 megabytes.

The Autobench testing showed a CPU performance of 4.33, which scores a very

good, although it was the slowest of the 386s we tested. The sequential disk access score was 1.35, earning a satisfactory. Random disk access scored a 2.71, and we rated it good. Both of the Compaqs tested successfully completed our 48-hour torture test.

Our software compatibility suite showed no problems in execution, though some of the color displays were hard to see on the monochrome screen, and only one speed setting (20 MHz). Software compatibility rates a very good. Hardware compatibility, on the other hand, would have rated unacceptable due to the lack of expansion slots. However, Compaq does offer an optional expansion slot add-on module with two full-size 8- or 16-bit slots for \$199. The availability

of the expansion box raises hardware compatibility to poor. (This expansion module wasn't used in our testing.) The minimum RAM with this machine is 1 megabyte, with the capability to expand to 10 megabytes. The Compaq 386 lacks any slots with the standard system. RAM capacity earns expandability a score of satisfactory.

Compaq supplies its usual thorough documentation. It is neatly tabbed into sections. There are photos to illustrate the various explanations given in the manual. A step-by-step guide for beginners is also included. The manual has an index and carries a table of contents in each of the tabbed sections. It lacks a troubleshooting chart. Compaq's fine manual rates very good.

Portable Computers: How We Tested and Scored Them

Tests in this product comparison are based on procedures we have followed consistently since 1985, with modifications to account for the faster systems that have become the norm.

We divide performance for both 286- and 386-based systems into six categories: CPU speed, hard disk sequential-access speed, hard disk random-access speed, software compatibility, hardware compatibility, and expandability.

Our benchmarks are reported as indexes, with the baseline of 1.00 being the 80286-based 6-MHz IBM PC AT Model 99 with a CMI-20 hard disk. Larger numbers in the CPU, hard disk sequential, and hard disk random tests indicate better performance. For example, a figure of 2.6 means the system tested is 2.6 times faster than the reference system.

The *InfoWorld* Hardware Benchmark System measures performance as it would be demonstrated by typical business applications, using the same operating system interfaces your programs do.

CPU Speed: To determine CPU performance among 286- and 386-based computer systems, we use specific systems as dividing lines. To achieve a score of excellent, a system must match or exceed the index of 4.99, the speed achieved by the Compaq Deskpro 386/20. The 16-MHz IBM PS/2 Model 80, which clocks in at 3.20 CPU, defines the dividing line for a score of very good; the 286-based IBM PS/2 Model 60, at 1.72 CPU, defines good; and 1.37 CPU — the speed of the 8-MHz IBM PC AT Model 339 — defines satisfactory.

Hard Disk Sequential Access: Programs like those for word processing, spreadsheets, and graphics load their data files from beginning to end. This is *sequential* access, in which the drive head doesn't have to move much (even though individual sectors may not be stored as a single unit). Our tests show how quickly a drive can accept a steady stream of incoming data. This is an important figure for those applications where your main use of the hard disk is to load large programs or large data files.

We award a score of excellent to systems whose sequential access earns an Autobench index of 3.51 or better. This is the value earned by the 16-MHz IBM PS/2 Model 80 system with the 70-megabyte ESDI hard disk drive — the leader in our November 2, 1987, product comparison of 386 systems. A very good score goes to systems with sequential access of 2.5 or better. Any system measuring 2.0 or higher earns a good rating; while a benchmark of 1.0 or higher is satisfactory. A poor score goes to systems with sequential performance benchmarks of 0.60 or better. Anything slower is unacceptable.

Hard Disk Random Access: Databases access hard disks differently than most other types of applications. Instead of loading or writing an entire data file, database applications reference small pieces of the file at random locations around the disk. This is *random* access, and performance in this area tests how quickly the drive head can move around consistently.

We award a score of excellent to systems whose random-access performance earns an index of 3.86 or better — the value earned by the Xtra Business Systems Model 740, the fastest random-access system in our November 2, 1987, product comparison. Any system with a random-access index above 2.80 earns a very

good score, while a 1.80 index earns a good score. Any system with a hard disk random access of 1.00 — the rating of the original CMI-20 hard disk in the 6-MHz IBM PC AT Model 99 — earns a satisfactory score. Above 0.60 earns a poor score; anything below that is unacceptable.

Software Compatibility: We can't test everything, but we have developed a software test suite that includes many of the most popular and most complicated business programs chosen to test different aspects of compatibility.

To test software compatibility for the 386s, we ran the following programs: Crosstalk XVI, Version 3.61; Lotus 1-2-3 and Word 4.0 under Desquiv, Version 2.01 with QEMM, Version 4.1; Lotus 1-2-3 and Windows Write under Windows 3.85; Sidekick Plus; Microsoft Word 4.0; and Paradox 2.0. For the 286s we used the same programs except we dropped QEMM and used Windows 3.03 instead of 3.86.

We also provide an unsecured throughput benchmark chart that simulates real-time uses of the following: Autocad, Version 2.62; Word Perfect 5.0; Dbase III Plus, Version 1.1; and Lotus 1-2-3.

Systems that run all components of our software test suite earn a very good score for software compatibility. Systems with more than two speeds (for extra software compatibility) receive an excellent score. We drop the score one grade for each program that won't run on the system.

Hardware Compatibility: To test hardware compatibility, we installed two peripherals that tend to be sensitive to problems in system timing or to hardware address incompatibilities: the ATI half-card modem and Ethernet network cards. Systems that run these without problems earn a satisfactory score in this category. We subtract one grade if either of these boards won't run. We also installed the Intel Above Board and Hard Card in those machines that could take them. We add one grade for each of these boards that a portable can run. A machine that runs none of the boards gets a poor grade.

Expandability: This measures how readily the system can be expanded to fit your needs. To earn a good score, each machine must have a minimum of 640K, expandable to at least 2 megabytes; one available half-height 16-bit slot; one serial and one parallel port; two half-height mounting positions; and the capability to drive an external monitor. We subtract one point for anything lacking. We add one-half point for more RAM than 640K as standard and for each extra serial or parallel port. A machine with no slots earns a poor score. The final grade is rounded down. Many of these machines offer expansion chassis with additional slots for an extra cost. Since these can be large — impeding portability — and vary in the number and type of slots available, we chose to maintain consistency and test expandability without them.

Documentation: at a minimum, should tell you how to set up and use the system, and include accurate diagrams. We illustrate that by an index of 4.00, based on detail of contents, troubleshooting help, and customization information (such as installing expansion boards or math coprocessors). We award bonus points for any of the following: a quick-start guide, an informative on-line tutorial, a glossary, on-line help for the system and MS-DOS, a quick-reference card, a

written tutorial, and a technical reference provided as part of the standard documentation package.

We lower the score if the manual is poorly organized, if it lacks both a table of contents and an index, if there are factual errors in the text, or if it does not include information on installing options (such as extra RAM).

Setup for all portables is quick and simple. You just plug them in, pull down the keyboard, turn them on, and you're ready to go. Unless otherwise noted, setup runs very good.

The ease-of-use score is a conglomeration of the controls available on the front panel of the machine, particularly the reset switch and the quality of the video display. All machines tested have reset switches unless noted. After visual examination by the reviews editors and test center technicians, we found the best displays to be electroluminescent; they rate excellent. Gas-plasma screens are very good. Liquid-crystal displays score good or lower. Keyboard layout and style also affect this area.

Well-designed and well-built systems offer better serviceability than badly designed or manufactured equipment. Nonetheless, systems do break. When they do, your concern is how quickly and inexpensively they can be repaired. We divide serviceability into three areas: workmanship, support policies, and technical support.

Workmanship: We carefully examine systems to see how well they are designed and constructed. We also run systems continuously for four days or longer, which weeds out the weaklings.

A good design uses a minimum of components. Each chip, resistor, capacitor, and connector represents one more chance for something to go wrong. The system must also be mechanically rugged to take the punishment of shipment and everyday use.

In evaluating a product's workmanship, we pay particular attention to how well the printed circuit boards are soldered. We divide serviceability into three areas: workmanship, support policies, and technical support. We also look for excessive last-minute changes.

Support policies: A one-year warranty and unlimited (but not toll-free) technical support results in a satisfactory score. We award bonuses for money-back guarantees, free newsletters, corporate or extended support, how-to, bulletin board, and support (e.g., CompuServe), a toll-free number, and extended warranties. We subtract points when the vendor provides no technical support or limits the period.

Technical support: We make several calls to vendors and dealers to determine the quality of technical support. For a satisfactory score, we must easily contact someone knowledgeable in technical support at least twice. Products get higher scores for in-depth product knowledge or support that goes beyond the call of duty, such as suggesting work-arounds to problems or other extras. Busy signals, being put on hold for long periods, and late or no callbacks all detract from the score.

Value scores reflect the price vs. the performance and features of the system. We look for an index of 3.00 or better. We divide 286s from 386s for this score.

An excellent value is one that offers top performance at a lower-than-average price; a satisfactory value features reasonable performance for a reasonable price; and an unacceptable score value goes to systems that continue poor performance with a high price.

The Compaq 386's front panel has a brightness control, a power indicator, and disk drive access lights. There is no hardware reset button. The plasma display is a reddish-orange color with good contrast. There are no glare problems with this easy-to-read display. The keyboard is compact. The key layout was comfortable and the escape key was in the normal \square keyboard position (upper left). The function keys are along the top. This keyboard had the best feel of the units that we tested. Ease of use earns a very good.

Compaq uses modern surface-mount technology for its circuit boards. We found no obvious patches or last-minute changes. One feature of this portable was easy access for the installation of the math coprocessor. Most of the others require complete disassembly to install the coprocessor. There is an aluminum subcase to supplement the sturdy plastic case. RF shielding is evident in the design of the circuit boards. The internal layout is crowded, although this is no surprise considering the physical size of the case. Workmanship earns a very good.

Compaq supplies a one-year warranty with the 386 portable. There are extended warranties available at extra cost. Compaq uses its dealers for technical support and has no manufacturer technical support line. We rate support policies poor.

We called dealers in the local area and received satisfactory answers to our technical questions. Dealers in your area may vary. Due to the lack of vendor-supplied technical help, we can only give a poor to technical support.

The Compaq Portable 386 offers very good speed for heavy-duty use. With a price of \$7,999 for 1 megabyte of RAM and a 40-megabyte hard disk, it also carries a heavy-duty price tag. (MS-DOS and Basic are \$120 extra; there is also a Model 100, with a 100-megabyte hard disk, for \$9,999.) The plasma display is

considered a plus. Using this computer in a computation-intensive environment would bring out its best value.

We rate the Portable 386 a satisfactory value.

Dolch

386 PACK

In 1987, Dolch presented the first portable 386 to the PC marketplace, a feat often attributed to Compaq. Since then the field has grown to produce a small harvest of lunch-box-style 286 and 386 portables. Dolch has updated its first system and now has three versions of its

386: a 16-MHz, 20-MHz, and 20-MHz with 64K cache.

We took a look at the 20-MHz 386 Pack without cache. It is a quick machine whose most appealing feature is its extremely clear, electroluminescent display. While most of the units we tested only emulate CGA or monochrome, the Dolch display emulates EGA. Dolch ships its portable with a 20-megabyte SCSI hard drive, a 1.2-megabyte 5 1/4-inch floppy drive, and 1 megabyte of RAM.

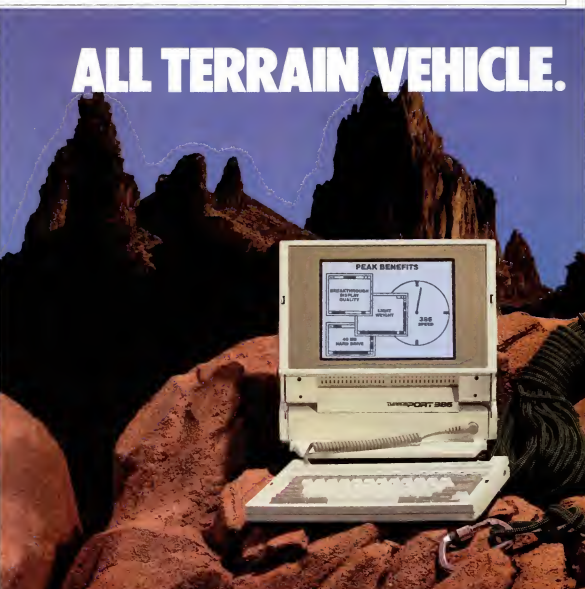
CPU access for the 386 Pack came in at 5.20 in our Autobench tests and tied for fastest in this comparison. This high ranking earns the machine an excellent in CPU access. Ratings for hard disk

sequential and random access were also high, but just under the cutoff for top scores. The 3.49 sequential and 3.41 random access rates each earn a very good. However, these ratings are based on an eight-hour Autobench time.

We tried our standard 48-hour Autobench several times on two different machines, but we were unable to complete the test. We did succeed in getting our eight-hour test to run, but the shorter time raises questions about the machine's reliability. The vendor admits to experiencing problems with its original power supplies; Dolch says it has taken steps to improve them.

The 386 Pack ran the programs in our

ALL TERRAIN VEHICLE.



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PRODUCT SUMMARY



Compaq Portable 386

MODEL 40

Company: Compaq Computer Corp.,
20555 FM 149, Houston, TX 77070,
(713) 370-0412.

List Price: \$7,999.

Features: 20-MHz, one-wait-state
38686 CPU; one serial, one parallel, and
one video port; 80387 coprocessor support.

Storage and Memory: 40-megabyte hard
disk; 1.2-megabyte 5 1/4-inch floppy
drive; 1 megabyte of RAM.

Support: One-year warranty from dealers
only.

Pros: Plasma display; well-built.

Cons: Price; no expansion slots in stock
unit; poor support.

Summary: Works best for computation-
intensive tasks; a speedy machine with
very good display, good construction,
and a high price tag.

386 software test suite without difficulty. With both 6- and 20-MHz operating speeds, the 386 Pack allows some additional flexibility and earns a very good for software compatibility. There are one free full-size 8-bit and one half-size 16-bit expansion slots in the 386 Pack, and we were able to install the ATI modem and the Ethernet card in the machine; both ran without any problems. We could not install the Intel Above Board since it requires a 16-bit bus, and the Plus Development Hard Card will not run in the 386 Pack since it conflicts with the SCSI drive. Dolch's system meets our minimum hardware compatibility requirements and earns a satisfactory in this category.

Minimum RAM on the 386 Pack is 1 megabyte, expandable in 2-megabyte increments up to 10 megabytes for the cache machine and up to 8 megabytes for the 386-20. The system also comes with two half-height mounting positions, two serial and one parallel port, and the capability to drive an external monitor. The Dolch motherboard can also support an 80387 math coprocessor. Without the capability to run a 16-bit card, the 386 Pack's expandability is no higher than satisfactory.

Dolch provides its own manual for the 386 Pack along with OEM documentation for the I/O card. The main user guide contains thorough setup instructions, but no shortened version for experts. There are illustrations throughout the setup section, along with one main diagram labeling each system part. Dolch's documentation lacks troubleshooting information for the system. Options such as additional RAM installation are covered in the user's guide, and Dolch provides a table of contents and glossary as well. Clear text and a clean layout top off this helpful book. Documentation earns a satisfactory.

The front panel of the 386 Pack sports a brightness control, reverse display button, and reset button. Power, hard disk, and turbo lights are also included. The 386 Pack video display uses electro-luminescent technology, which makes the

text and graphics even clearer than those that appear on gas plasma screens. The display has an amber tint that did not strain our eyes. And to add to this list of kudos, we found very little glare on this screen. The 386 Pack keyboard is a standard 101-key portable layout, with the function keys across the top. A constant frustration with this keyboard is its escape key, which resides on the numeric keypad. Despite the escape key position, the standard front-panel controls and keyboard, along with an outstanding display, earn the 386 Pack an excellent in case of use.

The internal layout of the Dolch 386 Pack is clean and uncluttered. We found no added components or wiring to the main boards on the Dolch 386. We did find one curiosity, however. The memory board's piggyback connectors were mounted on the back side of the board. Yet the back side of the card sits against the wall of the computer, leaving no room for a piggyback board. Similar cards in other portables had the mounts on the correct side of the board. This is a careless oversight, but it does not hinder the performance of the machine. Dolch's case is framed in aluminum, with a hard plastic exterior. In spite of its clean construction, workmanship rates no higher than poor due to the inability to run the 48-hour Autobench.

The 386 Pack comes with a one-year warranty on parts and labor. Currently there are no extended warranties for the

386 Pack, although a Dolch spokesman says that the company is negotiating for third-party support. Dolch handles all repairs and offers toll-free technical support from 8 a.m. to 5 p.m. Pacific time. Support policies for the 386 Pack earn a good score.

The technical support we received from Dolch was helpful and accurate. On our first call we got through immediately. On the second call we left a message and were called back within a half-hour. The technicians gave us prompt and correct answers to our questions. This courteous and trouble-free support earns a good score.

The solid features, speed, and impressive display of the Dolch 386 Pack don't come without their price. At \$6,995 (electroluminescent display, 1 megabyte of RAM, 20-megabyte hard drive), the 386 Pack is \$3,000 more than the lowest-priced 386, but it scores better than Compaq. The Dolch 386 Pack has a smaller standard hard drive than some of the other machines, although larger drives are available for additional cost. The unique plus to the 386 Pack is its display. It may be worth the extra cost for those who would use the portable machine for demonstrations or for long periods. The failure to run the 48-hour Autobench raises questions about reliability. Overall, the performance and features of the 386 Pack offset the price and reliability concerns to earn a satisfactory in value.

PRODUCT SUMMARY



Micro Express Regal II

Company: Micro Express, 2114 S. Grand Ave., Santa Ana, CA 92705; (714) 662-1973.

List Price: \$3,999.

Features: 20-MHz, zero-wait-state 80386 CPU; one serial, one parallel, and one video port; 80387 coprocessor support.

Storage and Memory: 40-megabyte MFM hard disk; 1.2-megabyte 5¼-inch floppy drive; 1 megabyte of RAM.

Support: One-year warranty.

Pros: Price; money-back offer; plasma display.

Cons: Light construction.

Summary: A fast machine with a good display and a great price tag (for a 386).

InfoWorld Hardware Benchmark Results

286 Portables

Compaq Portable III

Micro Express Regal

Sharp PC-7241

Micro Telesis SX¹

2.03

2.08

3.75

1.65

1.22

0.99

1.82

0.71

1.79

1.27

2.94

1.47

Hard Disk Sequential

Hard Disk Random

386 Portables

Compaq Portable 386

Dolch 386 Pack¹

Micro Express Regal II

Scantech LCD-386

4.33

5.20

4.70

5.20²

1.35

3.49

1.84

1.40

2.71

3.41

3.29

3.23

¹System unable to run 48-hour Autobench. Rating is based on 8-hour Autobench results. ²Testing with cache enabled. Score without cache is 4.70. Tests relative to the 640K (Model 690) CPU at 1.00. CPU test measures main processor performance; hard disk performance is tested for sequential and random data access. Higher numbers indicate better performance.

SOURCE: INFOWORLD HARDWARE BENCHMARK TEST 5.1 ITEM

PRODUCT SUMMARY



Dolch 386 Pack

Company: Dolch Computer Systems, 2029 O'Toole Ave., San Jose, CA 95131; (408) 435-1881, (800) 538-7506, (800) 223-2077 in CA.
List Price: \$6,995.

Features: 20-MHz zero-wait-state 80386 CPU; two serial, one parallel, one video port; 80387 coprocessor support.

Storage and Memory: 20-megabyte SCSI hard drive; 1.2-megabyte 5¼-inch floppy drive; 1 megabyte of RAM.

Support: One-year warranty.

Pros: Electroluminescent display; easy to use; fast.

Cons: Smaller hard disk; reliability concern.

Summary: An impressively quick machine with good performance, outstanding display quality, and midrange price.

Micro Express

REGAL II

Micro Express, better-known for its inexpensive desktop computer line, has now entered the lunch box computer market with its Regal line.

The Micro Express Regal II is a 386-based machine running at 20 MHz. It has a plasma display that emulates CGA. The Regal II uses 64K of cache memory to increase computation speed. It comes with the usual single serial and parallel ports. There is a video port for an external monitor. The motherboard in the machine has four expansion slots, but after installing the necessary hardware, there is only one half-length slot left. A 3 1/2-inch, high-density floppy drive and a 40-megabyte hard disk round out the Regal II package.

Our Autobench CPU rating showed a fast 4.70, a very good rating. The hard disk sequential rating showed a 1.84,

which gives it a grade of satisfactory. Random hard disk access earned a very good with an index of 3.29. We were able to run this suite for 48 hours without troubles.

Our software compatibility suite gave the Regal II no problems. It has two processing speeds (20 and 8 MHz.). As with other machines, emulation of colors on the plasma display didn't show well. The Regal II receives a grade of very good. Hardware compatibility was a problem due to the single slot and the fact that the access door covered the end of the only slot available. You could install a half-length modem, but you couldn't plug it in easily. We score hardware compati-

bility poor due to the lack of access to the available slot.

Micro Express ships the Regal II with a minimum of 1 megabyte of RAM, expandable to 10 megabytes. It meets our criteria for expandability but loses half a point for the lack of access to the usable 16-bit slot. We score a satisfactory for expandability.

Our view of Micro Express' preliminary documentation showed a well-laid-out design. We found adequate diagrams and substantial technical information on the computer. There are two large appendices containing extensive information. The table of contents was adequate, but the manual lacks an index. A step-by-

step start-up guide helps beginners. Documentation earns a good.

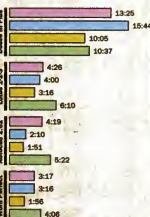
The Regal II has brightness and contrast controls for the plasma display. It also has a hardware reset switch, which is easy to hit accidentally. There is a disk access light and a power light in the front panel. The plasma display is easy to read for text, but it doesn't do color emulation very well. Glare isn't a problem here. The keyboard was very light in weight and had a flimsy feel to it; but the keyboard plug is a standard one, so you could get a standard full-size keyboard to work. Ease of use rates very good.

We found the case to be somewhat light in construction. The internal layout

InfoWorld Integrated Throughput Results

286 Portables

- Compaq Portable III
- Micro Telelink IX
- Micro Express Regal
- Sharp PC-7241



386 Portables

- Compaq Portable 386
- Dutch 386 Pack
- Micro Express Regal II
- ScanTech LDD-386



Figures refer to the time (in minutes:seconds) required to perform a suite of typical tasks in the particular programs. For more information on these tests, see product comparison of AT competitors, July 25.



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was crowded and there were many wires that were not well-placed. There were no visible patches or last-minute changes. Putting a math coprocessor into this computer is like digging an open pit mine — make your dealer do it for you. Workmanship rates satisfactory.

Micro Express offers a 30-day money-back guarantee and a one-year warranty with the vendor handling repairs. The vendor offers unlimited but not toll-free technical support. Support hours are 8:30 a.m. to 6 p.m. Pacific time. There is an extended warranty available at extra cost. Support policies rate a good.

Our contact with Micro Express' technical support lines produced mixed results. Some calls went right through and others produced a next-day callback. In all, we received satisfactory and polite answers to our questions. Technical support rates a satisfactory.

The Micro Express Regal II is a high-speed computer for any heavy-duty computing use. At \$3,999 it is one of the best 386-based values around. (DOS 3.3 and Basic cost \$79.) The standard box comes with 1 megabyte of RAM and a 40-megabyte hard drive. The plasma screen is a nice touch. We rate value very good.

Scantech

LCD-386

Scantech's LCD-386 is a fast performer that comes with an extra 64K cache boost and an impressive minimum of 2 megabytes of RAM on the motherboard.

As its name states, the LCD-386 has a liquid crystal display, and it is the clearest LCD we saw. The system is also shipped

with a 40-megabyte Seagate hard drive and a 1.2-megabyte, 5¼-inch floppy drive. RAM can be expanded to 10 megabytes. The LCD-386's 20-MHz speed can be slowed down to 6 MHz if needed.

The LCD-386 ran through our Autobench tests with impressive speed. The CPU rated a 5.20 with cache, and a 4.70 without. The first rating puts the LCD-386 well into the excellent range. While sequential access came in at a relatively slow 1.40, random access speed along with a 3.23 rating. Sequential access earns a satisfactory; random access earns a very good.

We had only one small complication running our software compatibility suite on the LCD-386. Our first attempts at running Lotus under Windows 386 resulted in the system randomly rebooting. After much frustration we finally adjusted the bit switches on the machine and the program worked fine. The vendor spoke with Microsoft and determined that Windows 386 requires the cache to be disabled; after we did that, the test suite ran well. All of the other test programs worked fine, including Desview with QEMM. These results, along with the LCD-386's two processing speeds, earn software compatibility a very good. On the hardware side, the LCD-386 ran with an ATI modem, Ethernet card, and Plus Development hard card. Hardware compatibility therefore earns a good.

The LCD-386 ships with one serial and one parallel port, two half-height mounting positions, and one free full-length 8-bit slot. The LCD-386 supports an 80387 math coprocessor, and we had no trouble setting up a NEC Multisync

PRODUCT SUMMARY



Scantech LCD-386

Company: Scantech Computer Systems Inc., 12981 Ramona Blvd., Units 1 and 4, Irwindale, CA 91706; (818) 960-2999.

List Price: \$8,995.

Features: 20-MHz, zero-wait-state 80386 CPU; one serial, one parallel, one video port; 80387 coprocessor support.

Storage and Memory: 40-megabyte MFM hard drive; 1.2-megabyte 5¼-inch floppy drive; 2 megabytes of RAM.

Support: One-year warranty.

Pros: 2 megabytes of RAM; cache; best LCD; compatibility.

Cons: Price.

Summary: A full-featured performer whose price still outweighs its benefits.

with the system. With the extra memory, expandability rates a very good, the best score of these portables.

Scantech includes the standard component documentation with its LCD-386 along with a user manual. The main manual is virtually identical to Dolch's with clear setup instructions and helpful diagrams. There is no troubleshooting for the machine, although the installation of some options is covered. The user manual has a table of contents and glossary but no index. Layout and text readability are average, and documentation earns a satisfactory.

The LCD-386 also has the same basic case as Dolch's 386 Pack. There are controls for reverse display, brightness, and screen tilt. Hard disk, power, and turbo lights are included along with a reset button. The 386 has the same keyboard as Dolch, with the small frustration of a misplaced escape key. (The vendor plans to offer a new keyboard some time in November.)

We were impressed with the quality of Scantech's LCD screen. The glare and fading we found with the Sharp and Micro Telisix just aren't present with Scantech. Two or more people can read the screen fairly easily, and it does not need as much fine adjustment in contrast and tilt. Still, the LCD is a step down from the gas plasma and electroluminescent examples we saw. Overall, ease of use earns a good.

There were no visible patches on the interior boards of the LCD-386. Although the layout of the cables and wires did not stand in the way of basic service to the machine. The case for the LCD-386 is also quite sturdy. Workmanship earns a good.

Scantech offers a one-year warranty on the LCD-386, a three-year extension costs \$495. The vendor will also offer BBS support in November. Repairs are handled through the vendor. Scantech maintains a technical support line from Monday through Friday from 7:30 a.m. to 5 p.m. Pacific time; it is not toll free. Support policies rate a good.

The help we received from Scantech's

support line was accurate and prompt. Each time we called, the technician was courteous and knowledgeable about the product. We had no trouble getting through on the line. Technical support earns a good.

Although the LCD-386 is impressive in performance and features, it packs a hidden punch. The \$8,995 price tag — for LCD, 2 megabytes of RAM, 40-megabyte hard drive, DOS, and Basic — is the highest in our comparison by \$1,000. (Scantech offers a 20-MHz 286 for \$5,579.) The LCD-386 has more standard memory than most of its competitors, and like Micro Express, it offers 64K of cache. Without a gas plasma display, this is still a lot to pay even for the memory benefits. Value for the LCD-386 rates poor.

286 PORTABLES



Compaq

PORTABLE III, MODEL 40

Compaq's 286-model lunch box is the Portable III, the successor of the previous portable line. It is also the most expensive of the 286 portables.

The Portable III runs at 12 MHz. Our test unit came with 1.3 megabytes of memory and a 40-megabyte hard disk. The optional internal modem was installed. The unit comes with a plasma display that emulates a CGA display. This display doesn't emulate the CGA colors very well, but it's easy to read text. There is a single serial port, a parallel port, and an external video port. The Portable III uses a 5¼-inch high-density drive.

Our 48-hour Autobench test showed a 2.03 CPU rating for the Portable III. This rating puts the machine in the middle range for 286 speed and earns a good. The hard disk sequential access came out at

PRODUCT SUMMARY



Compaq Portable III MODEL 40

Company: Compaq Computer Corp., 20555 FM 149, Houston, TX 77070; (713) 370-0412.

List Price: \$5,795.

Features: 12-MHz 80286 CPU; one serial, one parallel, one video port; 80287 coprocessor support.

Storage and Memory: 40-megabyte hard disk; 1.2-megabyte 5¼-inch disk drive; 640K of RAM.

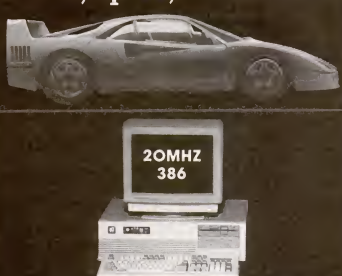
Support: One-year warranty from dealers only.

Pros: Plasma display; solid reputation.

Cons: Price; no expansion slots in stock unit; poor support.

Summary: A reasonably fast machine with a good display, excellent construction, and a high price tag.

Power, Speed, Performance



Any Questions?

80386 Intel processor running at 20 MHz
1 mb 32 bit RAM upgradable to 8 MB on motherboard
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1.22, earning the Portable III a score of satisfactory. The random access rate was slightly higher, at 1.79. This is sufficiently high to earn the Portable III a good in random access.

The Portable III passed through our software compatibility suite with ease. We did notice that when colors were used in a program, the plasma display didn't show up well. The 12-MHz fixed speed was the only thing preventing a score of excellent. We rate software compatibility very good. In hardware compatibility, however, the score is poor, due to a lack of slots in the standard unit. As with its 386, Compaq does have an expansion bus that adds two slots to the unit for \$199.

The minimum RAM supplied with the machine is 640K, expandable to 6.6 megabytes. The unit meets all of our expandability criteria, with one exception — the lack of slots. This lowers the expandability score to satisfactory. Compaq's manual is up to its usual well-designed standard, with tabs neatly dividing the manual into sections, each of which has an individual table of contents. Photos complement the descriptions given in the manual, and there is an index. Step-by-step guides offer help to the beginner. Technical information is sparse. The manual earns a score of very good.

The Portable III has a front panel brightness control along with LED indicators for power and disk drive access, but there's no hardware reset button. The plasma display is reddish-orange in color and gives good contrast with text; glare isn't a problem with this display. The compact keyboard had the best feel of the portables tested, and the layout was comfortable. The function keys were along the top row, as in an AT-style keyboard. Some of the portables tested had the escape key by the numeric keypad. The Compaq had it in the normal position. Ease of use earns a very good.

A look inside the case shows a crowded but well-laid-out interior. Compaq uses the latest surface-mount technology in its circuit board construction. We saw no obvious patches or last-minute changes. Installing a math coprocessor is a cinch. Most of the other lunch box portables have the coprocessor socket buried deep down inside the computer, where it is difficult to reach. The Portable III's case is a sturdy built plastic exterior with an aluminum chassis for support. Workmanship earns a very good.

Compaq supplies a one-year warranty with the Portable III. An extended warranty plan is available as an option. Compaq uses its dealers for technical support and has no manufacturer technical support line. We give a score of poor, due to dealer support only.

We called dealers in our area and received satisfactory answers to our questions. Due to the lack of vendor-supplied support, we can only give a poor to technical support.

The Compaq Portable III has good speed and should be satisfactory for all uses except the most intensive. The Portable III, Model 40's \$5,799 price tag is very high for an AT-class machine. (A 20-megabyte version costs \$4,999.) It is durable in construction, and the plasma screen is a definite plus. We score it a satisfactory value.

Micro Express

REGAL

Micro Express' 286 portable is the Regal,

an AT-class portable computer running at a blazing 20 MHz. Its plasma display emulates a CGA card, and the video card can drive an external monitor. The machine comes with a parallel and a serial port, a 40-megabyte hard disk, and a 5¼-inch, high-density floppy drive.

We successfully completed our 48-hour Autobench test suite on the Regal. The CPU rating was the fastest of the 286s, at 3.75, which earned a very good score. The hard disk sequential score came to 1.82, a satisfactory score. The hard disk random index was 2.94, which earned a very good.

The software compatibility suite ran without problems and earned the Regal a

very good. We could only run the ATI Modem and the Ethernet board, however. Hardware compatibility rates a satisfactory score.

Micro Express ships the Regal with 1 megabyte of memory, expandable to 8 megabytes. It has one 16-bit and one 8-bit half-height slot, one serial and one parallel port, and two half-height mounting positions. It will drive an external monitor and contains a position for an 80287 chip. The Regal meets our minimum qualifications for expandability and receives a score of good.

Micro Express' preliminary documentation for the Regal is virtually identical to that for the Regal II. The information is organized well, with adequate diagrams and substantial technical information. There are two large appendices containing extensive information. The table of contents was adequate but lacked a bit of detail; the manual also lacks an index. Documentation earns a good score.

The Regal's plasma display has both brightness and contrast controls. The hardware reset switch is in a somewhat exposed position and could be accidentally hit. The front panel contains power indicator lights and a disk access light. The plasma display has very readable text, but like other such displays in this comparison, it doesn't emulate colors very well. The display has a high contrast and glare is not a problem. The keyboard is very light and moves when you type on it. A bit more weight would help here. A possible solution is plugging a standard AT keyboard in. The Regal has standard keyboard connectors. We rate ease of use very good.

The case is light in construction and could be a problem if the computer takes some bumps. The interior layout is, as you might guess, crowded. We didn't find as many hanging wires in the case as we did in the Regal II 386 computer. There are no visible patches or last-minute corrections visible on the Regal. Putting a math coprocessor in this computer is as difficult as in the 386-based Regal II. Workmanship scores satisfactory.

Micro Express offers a 30-day money-

back and one-year warranty with the vendor handling repairs. The vendor offers unlimited technical support. Support hours are 8:30 a.m. to 6 p.m. Pacific time. There is an extended warranty available at extra cost. Support policies rate a good score.

Our contact with Micro Express' technical support lines produced mixed results. Some calls went right through and others produced a next-day callback. In all, we received satisfactory and polite answers to our questions. Technical support rates a satisfactory.

The Micro Express Regal is a high-speed AT-class computer, by the fastest 286 in this report. This one will do heavy-duty computing if a 386-based computer isn't required. We liked the plasma screen. With its \$3,399 retail price, the Regal is a good value.

Micro Telesis

SX

The Micro Telesis SX offers the lowest price for a 286 portable in our comparison — along with a 30-day, money-back guarantee.

The Telesis SX runs at 12 and 6 MHz with a zero wait state and an LCD emulating CGA. Micro Telesis also provides a 20-megabyte Seagate hard drive, and a 3½-inch, 1.44-megabyte floppy.

Earning a 2.08 in CPU access, the Telesis falls in the standard 286 speed range and earns a good. Sequential and random disk access were both less impressive, rating 0.99 and 1.27, respectively. Both access ratings earn a satisfactory. The Telesis was unable to run our 48-hour Autobench. These results are from our eight-hour test. We obtained a second unit to run our 48-hour benchmark, but it arrived with a defective hard drive.

Our software test suite ran without a hitch. Test results, combined with Telesis' two processing speeds, earn it a very good in software compatibility. The Telesis was able to run more of our hardware compatibility tests than most other portables. The ATI Modem, Intel

PRODUCT SUMMARY



Micro Express Regal

Company: Micro Express, 2114 S. Grand Ave., Santa Ana, CA 92705; (714) 662-1973.

List Price: \$3,399.

Features: 20-MHz, zero-wait-state 80286 CPU; one serial, one parallel, one video port; 80287 coprocessor support.

Storage and Memory: 40-megabyte MFM hard disk; 1.2-megabyte 5¼-inch floppy drive; 1 megabyte of RAM.

Support: One-year warranty.

Pros: Fastest 286; money-back offer.

Cons: Light construction; Micro Express 386 is only \$600 more.

Summary: A blazing 286 with a good display and a fair price tag.

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Like Compaq's.

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Above Board, and Ethernet card all ran in the five full-length 16-bit slot provided. Unfortunately, the Plus Development Hard Card requires an 8-bit-only slot, so

it could not run. Nonetheless, hardware compatibility earns a good.

In expandability, the Telesis ships 640K of RAM standard on the motherboard, and it is expandable to 4 megabytes. The system has two parallel and two serial ports, three 3½-inch half-height mounting slots (one internal and two external), and one free 16-bit full-length slot. A monochrome or CGA monitor will run off of the RGB port provided, although we could not get the SX to recognize our NEC Multisync EGA. We called tech support, and they suggested new DIP settings; these didn't work. The next time we called, the tech said that the machine must not run the Multisync, and suggested that we use a mono or CGA monitor. An 80287 math coprocessor can also be installed on the Telesis motherboard. Expandability earns a good.

We received several bits of OEM documentation with the Telesis, including some details on the disk controller, motherboard, and floppy drive. For the Telesis system itself there was a small, photocopied user's manual covering setup and basic technical specifications. There were a few diagrams showing basic system parts, along with some internal components. Aside from this, the documentation has a table of contents but no index or glossary. We feel that Telesis provided the bare minimum for its system. Documentation earns a satisfactory.

Telesis' front panel contains a turbo button, contrast control, and reset button. There are also indicator lights for power on/off, hard disk access, and turbo mode.

There is an LED readout indicating the system's present clock speed. The Telesis sports a deep-blue LCD. The screen is larger than some of the others tested, approximately 9 by 6 inches, instead of the common 9 by 4 inches. While the larger screen area is a plus, the blue LCD tone is a definite minus. It is very difficult for more than one person to read the screen at the same time. When viewing the screen from the side of the machine, the images fade or disappear, making the Telesis a poor choice for product demonstrations. Even when using the Telesis individually, we found ourselves frequently adjusting the contrast or the screen tilt.

Another frustration came when hooking up an external monitor. According to technical support, you must first disconnect the internal LCD plug before installing a monitor. This requires opening the back of the machine (no small feat on this unit), pulling the LCD plug, then putting it all back together and calibrating the new monitor. The Telesis SX keyboard is fairly standard with the exception of a misplaced escape key. The frustrating display and difficult procedures for external monitor installation drop case of use to poor.

Once we got past the eight back-panel screws, we found no last-minute wiring or patches on its internal boards. Getting into the machine took major effort; most portables have just three easily accessed screws. The serial and parallel ports for the Telesis are lined along the top edge of their video card. The card is braced by three screws that come in through the

back of the machine. This adds additional hassle to taking off the back cover. In addition, if the screws aren't in place, the card is not stable. It would have been nice to see the board braced on the inside rather than by external screws. While this arrangement may be good in theory, Micro Telesis does not pull it off in the design of its machine. The failure to run the 48-hour Autobench raises questions about reliability and contributes to a poor score in workmanship.

When it comes to support policies, Micro Telesis strikes gold. They offer a 13-month warranty on the Telesis SX along with a 30-day, money-back guarantee. Micro Telesis also handles repairs with a 48-hour turnaround time promised. An extended warranty is available for one year at 8 percent of the purchase price. There is a technical support line maintained from Monday to Friday 8 a.m. to 5 p.m. Pacific time, although Micro Telesis does not offer a toll-free number. Overall, these impressive support policies earn a very good.

Micro Telesis' technicians were courteous and prompt in their responses. On our call for setting DIP switches for the Multisync, however, we were given incorrect settings for the monitor. Because of this misinformation, Telesis' technical support earns no higher than satisfactory.

For \$1,899 — with LCD, 640K, 20-megabyte hard drive — it is hard to resist the Telesis SX. (DOS 3.3 and Basic cost \$85; a gas plasma display option is \$500; and you can get an external chassis that you can insert any 5¼-inch floppy drive into for \$49.) A money-back guarantee adds to this system's appeal, but the poor readability of the LCD and the reliability concerns might frighten some buyers. Micro Telesis' price just can't be beat; we rate value good.

PRODUCT SUMMARY



Micro Telesis SX

Company: Micro Telesis Inc., 1260 Logan St., Suite A-2, Costa Mesa, CA 92626; (714) 557-2003.

List Price: \$1,899.

Features: 12-MHz, zero-wait-state 80286 CPU; two serial, two parallel, one video port; 80287 coprocessor support. **Storage and Memory:** 20-megabyte Seagate MFM hard drive; 1.44-megabyte 3½-inch floppy drive; 640K of RAM.

Support: 13-month warranty.

Pros: Money-back offer; least expensive portable.

Cons: Poor LCD; smaller hard disk; reliability concern.

Summary: Terrific value if the display doesn't hold you back.

REPORT CARD

80386 Portable Computers

	(InfoWorld weighting)	(Your weighting)	Compaq Portable 386	Dolch 386 Pack	Micro Express Regal II	Scantech LCD-386
Performance						
CPU Speed	(75)	()	Very Good	Excellent	Very Good	Excellent
Hard disk access, sequential	(50)	()	Satisfactory	Very Good	Satisfactory	Satisfactory
Hard disk access, random	(50)	()	Good	Very Good	Very Good	Very Good
Software compatibility	(150)	()	Very Good	Very Good	Very Good	Very Good
Hardware compatibility	(125)	()	Poor	Satisfactory	Poor	Good
Expandability	(75)	()	Satisfactory	Satisfactory	Satisfactory	Very Good
Documentation	(50)	()	Very Good	Satisfactory	Good	Satisfactory
Setup	(50)	()	Very Good	Very Good	Very Good	Very Good
Ease of use	(50)	()	Very Good	Excellent	Very Good	Good
Serviceability						
Workmanship	(50)	()	Very Good	Poor	Satisfactory	Good
Support policies	(50)	()	Poor	Good	Good	Good
Technical support	(100)	()	Poor	Good	Satisfactory	Good
Value	(125)	()	Satisfactory	Satisfactory	Very Good	Poor
Final scores			5.4	6.4	6.0	6.3

Use your own weightings to calculate your score.

GUIDE TO REPORT CARD SCORES

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent — 1.0 — Outstanding in all areas.

Very Good — 0.75 — Meets all essential criteria and offers significant advantages.

Good — 0.625 — Meets essential criteria and includes some special features.

Satisfactory — 0.5 — Meets essential criteria.

Poor — 0.25 — Falls short in essential areas.

Unacceptable or N/A — 0.0 — Falls to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final possible score (10 plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to InfoWorld readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

INFO WORLD

Sharp

PC-7241

The last entry of our 286 portables, the Sharp PC-7241 incorporates an adapta-

PRODUCT SUMMARY



Sharp PC-7241

Company: Sharp Electronics Corp., Systems Division, Sharp Plaza, Mahwah, NJ 07430; (201) 529-9500.

List Price: \$4,495.

Features: 10-MHz, zero-wait-state 80286 CPU; one serial, one parallel, one video port; 80287 coprocessor support. **Storage and Memory:** 40-megabyte hard drive; 1.2-megabyte 5¼-inch floppy drive; 640K of RAM.

Support: One-year warranty.

Pros: Very compatible; small; three processing speeds; easy to use.

Cons: Price; poor drive access rating; frustrating technical support.

Summary: Comfortable machine that just can't overcome its price or performance limits.

tion of a Plus Development Hard Card as its 40-megabyte hard drive. This saves some space inside and makes the unit a little slimmer than some of its competitors. On the other hand, this system's overall speed and access time was the slowest tested.

The PC-7241 runs at 6, 8, and 10 MHz with zero wait states. Along with the hard drive, the system has a high-density 5 1/4-inch floppy drive and comes with 640K of RAM. A backlit LCD rounds out the PC-7241's basic features. If you want to take the office with you, there's even a thermal transfer printer that snaps onto the back of the case.

In our Autobench program, the PC-7241 rated a 1.65 in CPU access. This places it into the satisfactory range, an unimpressive accomplishment for a 10-MHz machine. Access ratings for the 40-megabyte drive weren't any higher. Sequential access at a 0.71 earns a poor. Random access is a bit higher at 1.47 and earns satisfactory.

Running the software programs in our compatibility suite posed no problems on the PC-7241. Each program and the respective test files ran completely, and the machine offers three clock speeds. Software compatibility earns an excellent. We installed our ATI modem, Plus Development Hard Card, and Ethernet cards into the Sharp without difficulty, and each ran fine. The Intel Above Board could not be installed since Sharp only offers an 8-bit slot. Hardware compatibility earns a good.

Although the PC-7241 comes with 640K, it is only expandable to 1.6

megabytes. There is one parallel and one serial port, one half-height mounting position, and one full-length 8-bit slot. The PC-7241 drove our NEC Multisync without any problems. Sharp offers an additional expansion box for \$699. It carries two 16-bit and two 8-bit slots. With the limited memory expansion, expandability drops to a poor.

The documentation for the PC-7200 comes in an attractively bound, three-ring binder complete with index tabs. The instructions are geared toward the novice user, with ample illustrations depicting the computer, its ports, and its peripherals. The troubleshooting section contains an informative chart with symptoms and possible causes. A table of contents, an index, and a glossary round it out. The only items lacking are a quick-reference card and a short setup section for experienced users. Documentation earns a good score.

On the front and back panels of the PC-7241 are loaded with various controls and adjustments. On the front are power, screen standby, floppy drive, and hard disk lights along with contrast and brightness controls, inverse video switch, and a tilt control. There is no reset button on the PC-7241. The back panel sports switches to set processing speed, CGA or monochrome emulation, the speaker volume, and internal or external monitor. All of the back panel switches are unique to this portable and very handy.

The PC-7241 has a screen similar to, but smaller than, the screen on the Telisix SX. It is LCD with a blue tint. We found some of the same problems with it as we

did on the Telisix SX. It is difficult for more than one person to view the screen, and even a single user has to frequently adjust contrast or tilt. Sharp's keyboard has a unique layout, with the function keys smaller in size than the rest of the keys. This could be a little frustrating when using programs that are function-key intensive. There is also a setup key on the upper right that brings up a setup menu, which allows you to select and change your printer and serial ports, underlining, power-up alarm, backlight timeout, and clock, among others. Overall, the helpful extra controls outweigh the hindrances of the screen. Ease of use earns a good.

There were six last-minute patches and extra wires on the PC-7241 motherboard, as well as a patch of them on the controller card. The motherboard is set at the rear of the machine, so it is easier to access than those on the other portables we tested. Sharp's case is sturdy, with adequate clips to hold the keyboard in place while transporting the unit. The patches on the internal boards are offset by the convenient motherboard position; we rate workmanship satisfactory.

Sharp offers a one-year warranty on the PC-7241. The company handles repairs through four domestic repair depots and offers a toll-free support line. Technical support is available from 9 a.m. to 5 p.m. Eastern time.

There are several extended warranties available at extra cost. Support policies earn a good.

We failed to get through on the Sharp technical support line. Several times we

were put on hold for over seven minutes, without a chance to leave a message. Other times we repeatedly received a busy signal. Due to our inability to reach Sharp, technical support rates an unacceptable.

Sharp has the second highest price of the four 286 machines tested. At \$4,495 (LCD, 640K RAM, 40-megabyte hard drive, DOS, and Basic), it also offers inferior performance compared to its competition. Frustrating technical support adds to its problems. Even the solid scores in ease of use and compatibility can't bring its value higher than poor.

Executive Summary

For the 386s we tested, prices varied by \$5,000. That span ranges from very good to poor in our tests.

At the head of the value field was the runaway price leader: **Micro Express Regal II**, which costs just \$3,999 and bears its nearest competitor by \$3,000. It comes with a nicely readable gas plasma display; the only major turn-off for the great price is in hardware compatibility.

The **Dolch 386 Pack** tied for fastest machine tested, finishes second in price, is easy to use, and offers the best display. It is a solid performer that outpoints Compaq on our report card. But the Dolch failed our 48-hour Autobench, which raises a reliability question. The vendor says it is correcting power supply problems.

The **Compaq Portable 386** has a well-deserved reputation for durability and performance. However, dealer support is spotty, you'll need to buy an add-on to get more slots, and its merits don't come cheap. The Compaq costs \$2,000 more than the Dolch, but without significant advantages.

At a staggering \$8,999, the **Seagate LCD-386** offers great performance, but the price is indigestible. In the 286 arena, our price spectrum varied by \$3,900, also ranging from very good to poor in value.

You can practically steal the **Micro Teleisix SX** — it costs just \$1,899. If generally operates well and has a money-back guarantee. On the flip side, the Micro Teleisix has the disadvantage of a poor display, it's a struggle to attach another monitor, and it also failed our 48-hour Autobench, which questions its reliability. However, it's \$1,500 cheaper than the next 286.

The highest scoring 286 machine on our report card is the **Micro Express Regal**, a 20-MHz unit that offers the best overall package, with a money-back guarantee, and superior display and performance over the 286 SX.

The **Compaq Portable III**, like its 386 sibling, is a capable, sturdy unit with a good display. Like the 386, you must reach your dealer for support, there are no slots, and it carries a high price: \$5,799 — you could get Micro Express' 386 for \$1,800.

For \$1,300 less you can buy the **Sharp PC-7241**, an easy-to-use compact unit that earned the best compatibility ratings of any unit in this comparison. However, it is the slowest machine we tested, and technical support was unreachably.

REPORT CARD

80286 Portable Computers

	(InfoWorld weighting)	(Your weighting)	Compaq Portable III	Micro Express Regal	Micro Teleisix SX	Sharp PC-7241
Performance						
CPU speed	(75)	()	Good	Very Good	Good	Satisfactory
Hard disk access, sequential	(50)	()	Satisfactory	Satisfactory	Satisfactory	Poor
Hard disk access, random	(50)	()	Good	Very Good	Satisfactory	Satisfactory
Software compatibility	(150)	()	Very Good	Very Good	Very Good	Excellent
Hardware compatibility	(125)	()	Poor	Satisfactory	Good	Good
Expandability	(75)	()	Satisfactory	Good	Good	Poor
Documentation	(50)	()	Very Good	Good	Satisfactory	Good
Setup	(50)	()	Very Good	Very Good	Very Good	Very Good
Ease of use	(50)	()	Very Good	Very Good	Poor	Good
Serviceability						
Workmanship	(50)	()	Very Good	Satisfactory	Poor	Satisfactory
Support policies	(50)	()	Poor	Good	Very Good	Good
Technical support	(100)	()	Poor	Satisfactory	Satisfactory	Unacceptable
Value	(125)	()	Satisfactory	Good	Good	Poor
Final scores			5.3	6.3	5.8	5.0

Use your own weightings to calculate your scores

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Poor = 0.25 — Falls short in essential areas.

Unacceptable or N/A = 0.0 — Falls to meet minimum standards or lacks this feature.

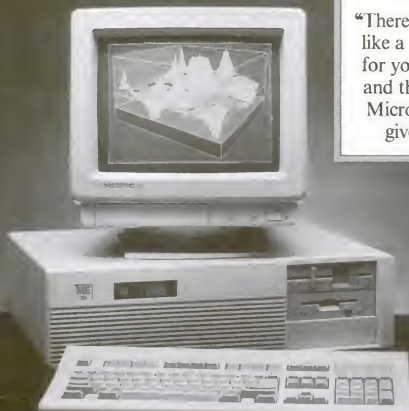
Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to InfoWorld readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

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Heading a full line of competitively-priced 386 and 286 portable and desktop computers from the company where one-day service is never a problem. Reliability is the key word for Micro Express products. All Micro Express PC's are burned in for at least 72 hours to eliminate infant mortality problems. Further, a one-year warranty is provided on parts and labor.

DESKTOP COMPUTERS

ME 386-20
\$2650

- 80386 processor running at 20 MHz
- 1 MB of RAM upgradable to 8 MB on same board
- Zero wait state operation
- Socket for 80387 math co-processor
- One 32-bit expansion slot
- Five 16-bit expansion slots
- Two 8-bit expansion slots
- 1.2 MB floppy disk drive
- 40 MB fast access hard disk (up to 380 MB available)
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Model	Standard Unit	With Monochrome Card and Monitor	With EGA Card and Monitor	With VGA Card and Monitor	80 With Hard Disk Upgrade	Upright Case
386-20 Desktop	\$2550	\$2800	\$3250	\$3500	\$500*	\$300
386-18 Desktop	\$1799	\$1949	\$2399	\$2649	\$700	\$300
286-20 Desktop	\$1899	\$2049	\$2499	\$2749	\$500*	\$300
286-12 Desktop	\$1899	\$1049	\$1499	\$1749	\$700	\$300

*Suggested \$996

Circle 10 on Reader Service Card

ME 286-20 \$1899

- 80286 Processor running at 20 MHz
- 1 MB of RAM upgradable to 8 MB on Main Board
- Zero Wait State Operation on Memory
- Page Mode Interleave Memory
- LIM (Lotus-Intel-Microsoft) 4.0 support for Memory over 1 MB
- Socket for 80287 Math Co-processor
- Real Time Clock/Calendar with CMOS RAM and Battery Back-up
- Microsoft DOS and OS/2 compatible
- High Performance NCL Floppy/Hard Disk Controller*
- 1.2 MB Floppy Disk Drive (1.44 MB or 360K options at no extra cost)
- 40 MB Fast Access Hard Disk (up to 380 MB available)
- Serial and Parallel Ports
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- One Year Warranty on Parts and Labor

For Each Additional Meg of RAM Add \$450

ME 286-12 \$899

- 80286 Processor running at 6/12 MHz
- 512K Memory on Main Board (upgradable to 1 MB)
- Zero Wait State operation
- 8 I/O Expansion Slots
- CMOS Clock/Calendar Circuit
- Socket for 80287 Math Co-processor
- NCL Floppy/Hard Disk Controller* (SCSI optional)
- 1.2 MB Floppy Disk Drive
- AT-style Keyboard

PORTABLE COMPUTERS

Regal II (Gas Plasma Display) \$3999

- 80386 Processor running at 20 MHz
- 1 MB of RAM (Expandable to 10 MB using Piggy-Back Board)
- Zero Wait State Operation
- 64K of Cache implemented with 35/40ns Static RAM
- Socket for 80387 Math Co-Processor
- Norton S.I. Rating of 23
- AMI Bios with Set-up and Diagnostics in ROM
- 640 x 400 Super High-Resolution Gas Plasma Display
- 80 characters x 25 lines
- Software Switch between Monochrome or Color Graphics Software and Mono, Color, EGA or Gas Plasma Screens
- High Performance NCL Floppy/Hard Disk Controller*
- 1.2 MB Floppy Disk Drive (1.44 MB or 360K Free Replacement option)
- 40 MB Fast Access Hard Disk (80 MB optional)
- Serial and Parallel Ports
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FIRST LOOK ■ BY MICHAEL J. MILLER

System Sleuth Tracks Down Hardware/Software Conflicts

Have you ever suspected that two terminate-and-stay-resident (TSR) programs were conflicting, but weren't quite sure? Or wondered what addresses were free, so you could insert a new I/O card? Or have you ever just wondered what was going on within your system?

If so, a new program called System Sleuth may be just what you've been looking for. It's a great tool for technical analysis of your hardware.

Simply put, System Sleuth analyzes what's in your computer, covering everything from memory to add-in boards to disk drives.

When you start the program, it gives you an overview of the entire system, listing the processor and BIOS type, the version of DOS, and the number and location of the serial and parallel ports, as well as an overall listing of memory locations showing which ones are occupied by DOS, EMS page frames, video memory, and I/O cards.

From there you can move to various detail screens, with more information on the disks, memory, video, and I/O cards.

For instance, it can tell you the formatting details of your hard disk, the number of files and directories, the structure of the File Allocation Table, and the number of copies of the FAT the machine keeps. System Sleuth is meant to be an analysis tool, so it doesn't do anything

that could be destructive, such as reformatting or defragmenting your disk.

Display information includes the type of display adapters attached or emulated (an EGA emulates a CGA; a VGA both an EGA and CGA) and the kind of monitor attached, as well as more technical information on the particular video modes supported and the amount of video memory.

The program has various screens showing the contents of the system's memory. An initial screen tells you how much conventional, extended, and expanded memory you have in your system and available, as well as the type of EMS the machine has and the location of the EMS page frame.

One of the more useful screens is a list of TSR programs, where they are situated in memory, and what interrupts they hook. Similarly, a device chain shows you all your device drivers and when they loaded in memory. All these can be quite helpful when you are trying to figure out if various programs are conflicting, or why you don't have enough memory to load another program.

If you're trying to install a new card, the I/O card area information is quite useful. System Sleuth lists which memory addresses for I/O cards are in use, and tries to read the copyright notice for each card so you can tell which card is using which addresses. One potential problem: this screen only lists physical cards, not EMS page frames.) You can also examine

the contents of any location of memory, and view that in ASCII or Hexadecimal.

All this information is interesting, but it may not be useful unless you know what it all means. For instance, some interrupts can be easily shared by many devices; other interrupts cause trouble when they are shared. System Sleuth tries to assist with on-line help, including

"Someone supporting a number of machines might use System Sleuth to analyze machines when trouble strikes."

tutorials on such things as system interrupts and TSRs (telling you how those programs work) and tables showing common interrupts and what they do, system board switches, I/O port addresses, and device attributes.

The program comes with a rather simple manual, but the vendor says it will prepare a more complete and detailed

technical reference manual, which it will send to registered users.

When you're finished analyzing a machine, the program can produce reports showing the results of each individual section or all of the sections. You can add your own header to each page, and include up to 15 lines of notes or technical support information.

A couple of caveats: System Sleuth is not a diagnostic tool, so it won't show you if any parts of the machine aren't working right. And although System Sleuth runs under multitasking operating environments (such as Desqview or Windows), you might get misleading results because those environments routinely map information from one part of memory to another as they switch among programs.

Still, I can easily imagine that someone supporting a number of machines might just add System Sleuth to his or her grab bag of tools to help analyze those machines when trouble strikes; you can run the program from a hard disk, or just from a floppy. You might even want to print, for your records, reports for each machine you support.

The \$149 program requires an IBM PC or compatible and is available now from DTG Inc., 23704-5 El Toro Road, Suite 348, El Toro, CA 92630; (213) 987-2000.

First Look examines new personal computer products before they have been through a formal review.

SpinRite™ Will Speed Up Your Hard Disks, or Your Money Back!

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Last year when I was researching a TechTalk column on hard disk interleaving, I discovered that nearly 100% of the hard disks in the world are not interleaved correctly. This misinterleaving decreases your hard disk data transfer rate by 50% to 600%!

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DESQview System Requirements: IBM Personal Computer and 100% compatible (with 8088, 8086, 80286, or 80386 processor) with monochrome or color display; IBM Personal System/2+ Memory 640K recommended; for DESQview 386 Intel 386 or 486; Expanded Memory (Optional) expanded memory boards compatible with the Intel AboveBoard, extended expanded memory boards compatible with the AST RAMage; EMS 4.0 expanded memory board; Disk: two diskette drives or one diskette drive and a hard disk; Graphics: Color (Optional); Hercules, IBM Color/Graphics CGA, IBM Enhanced Graphics Adapter (EGA), IBM Personal System/2 Advanced Graphics (VGA); Mouse: Optional; Monitor: System, Microsoft and compatible; Modem for Auto-Dial (Optional); Hayes or compatible; Operating System: PC DOS 2.14 or MS-DOS 3.2 or 3.31 or 3.61; Main PC DOS and MS-DOS application programs, programs specific to Microsoft Windows 1.0-2.1, IBM 1-3.4, IBM Software 1.1 or 1.2; DESQview 2.2 is available on either 5-1/4" or 5-1/2" floppy disks.

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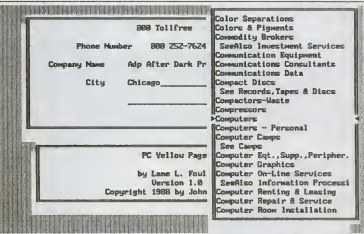
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* Requires DESQview or QEMM-386 registration card in file of Quarterdeck or included with upgrade order; upgrades free to owners who show proof of purchase after August 1, 1988. Quarterdeck's priority service users: 33% discount from priority sales plus tax and shipping/handling. ** Post payment proof of purchase of any multitasking operating environment—the cover of your manual will say—send it to us along with the appropriate priority service shipping, handling and tax.

IMPRESSIONS



PC Yellow Pages contains a scrolling index of 800-number businesses.

■ PC YELLOW PAGES

Phone List Application's Great Idea But Suffers From Annoying Quirks

PC Yellow Pages is a great idea — instant access to a collection of business names and phone numbers, sorted by business type — but the implementation of the idea is flawed.

At first glance, it seems to be a bargain, with 15,000 names and phone numbers and 5,000 addresses for \$99.99. That's less than 7 cents apiece, a reasonable price considering you also get software to manage the list, including mail merge and auto-dialing if you have a modem. Calling information for individual numbers would cost more. The program has pop-up windows, color, and graphics, and indexes are held in memory, which makes access quick.

Unlike most applications, the information in this software has greater value than the application itself. The names, phone numbers, and addresses are the critical part, especially since the big cost of using this data will be in the time and money spent on telemarketing or direct mail to the companies on the list.

That's why it was disappointing to find a lack of quality control readily apparent in the data. In five minutes I found 10 errors, including IBM spelled "International Business Machn." The street name for Autodesk was spelled wrong, and *Avenue* and *aviation* were also misspelled.

PC Yellow Pages' interface is attractive, with some nice touches such as automatic scrolling when you type the first few letters of an entry you're seeking. But again, there are annoying quirks. The Escape key backs you out of menus, but it doesn't do a batched entry; it just enters a blank record, which then has to be manually deleted.

With this issue, InfoWorld starts a new section, called *Impressions*, in which individual staff members take a quick look at new and unreleased products and at products that we would not otherwise review. Unlike First Looks and Short Looks, these impressions are based on demonstrations and limited hands-on experience, rather than detailed testing and analysis. Each represents the opinion of the individual writer.

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■ PROMPT

Perplexing Windows File Manager In Dire Need of a Second Version

One of the trade-offs of using Microsoft Windows is putting up with the DOS Executive, the abysmal file manager supplied with Windows. The field is wide open for a better file manager to run under Windows. Prompt, from Access Softek, isn't quite it.

Prompt (\$79) provides the same file handling commands as the Executive and adds a directory tree and some unique features, including a Library.

The Search function has the special feature of accumulating results from search to search, which can be useful in combination with the Library function. The Library allows you to define subject names and then let Prompt to associate that subject with a selection of files, such as the set of files you just accumulated in the Search window.

Unfortunately, this program does not use menus in a normal fashion. Three of the menus are actually buttons that call

up dialog boxes. It is these boxes that contain nearly all the actual commands.

The notable exceptions were the commands to create and delete directories, which were nowhere. The documentation explains that to create a directory, you must open the Tree view, point at the parent-to-be directory, and drag to the right. Deleting a subdirectory seemed impossible; a call to technical support revealed that in fact it is impossible. Prompt, Version 1.0 simply does not let you delete subdirectories.

Overall, this program cries out for a second version. The Tree view is a overdue addition to Windows file handling, and the Library is a fine idea. As Version 1.0 stands, however, it isn't much better than the Microsoft Executive, and in its tendency to perplex, it is at times worse.

Access Softek, 3204 Adelaide St., Berkeley, CA 94703; (415) 654-0116.

— Thomas Cox

■ AVERY OVERHEAD TRANSPARENCIES

Avery Product to Make the Creation Of Presentation Graphics Easier

Whenever I give a presentation, I like to use overheads. With desktop presentation programs (such as PowerPoint, Cricket Presents, Standout, More II, and Xerox Presents) and the increasing popularity of presentation graphics programs, it's become much easier to design a presentation on-screen. Typically, I've printed the results on paper in a laser printer, then copied from the laser printer onto transparencies.

Avery has a better solution with its Overhead Transparencies for Desktop Laser Printers, which are specifically

designed to travel through laser printers without jamming. The transparencies go through the printer with a paper backing that is removed after printing. I've tried this out and found it simple and easy. It worked smoothly and the transparencies looked good.

The transparencies are available in a file package with 20 transparencies for \$11.85, or in a box of 50 for \$25.76.

Avery Commercial Products Division, 818 Oak Park Road, Covina, CA 91724; (800) 541-5507.

— Michael J. Miller

■ PRIVATE EYE

Monocular Video Screen Virtually Puts Brain On-Line

Perivate Eye looks like something out of the movie "Brainstorm" — it puts a video representation of your computer output in front of your eyeball in the same way that the eyepiece on a video camera shows the cameraman the scene he is shooting. The difference with Private Eye is that beyond the monocular eyepiece that weighs only a few ounces, there is no serious weight or tether to the near-Hercules resolution (720 by 280). Peering with one eye into a 1.2-inch-by-3.2-inch eyepiece that is strapped to a headset, your other eye is free to observe the real world. You can even compare real objects to images in the eyepiece.

Reflection Technology showed us a prototype of the device, but the results were impressive. It took approximately one minute for me to adjust my eyes to it, and my glasses did not seem to present any problem in viewing the image. The image of a spreadsheet appeared crystal clear in a vibrant, non-straining red. The

tiny screen appeared to be several feet in front of the eye, and you can read document at normal reading distance with the other eye.

There was a slight sound and movement from some sort of internal vibration in the device (the vibration comes from part of its proprietary optical technology), but it is not really a distraction. Apparently this is being cleared up by the vendor. Since the demonstration lasts only a few minutes, there is no way to gauge the effects of long-term, steady usage of this new technology on human vision, but we doubt it will be much worse than staring into a full-size monitor all day.

The many applications that spring to mind for this kind of device will especially be possible if, as Reflection Technology asserts, Private Eye appears at retail prices under \$100.

We suspect there are applications for this technology that have not yet even been imagined by its MIT-based inventors. Where the mouse brought us the era



Private Eye provides a one-eyed view.

of point-and-click, this may take us into the era of decisions based upon comparison of real and ideal images.

Reflection Technology, 171 Third St., Cambridge, MA 02141; (617) 547-2422.

— Martin Marshall

REVIEWS

Everybody's doing it — offering a downsized version of their regular desktop-hogging computers. Now Compaq joins in with the Compaq 386/20e, also known as the Horizon, 30 percent smaller but with the same power as the hefty Compaq 386/20 it replaces. The main trade-off is the smaller system, which has four slots instead of six.

FEATURES:

The Compaq 386/20e features the Compaq Flex Architecture, which separates memory from peripherals so that 32-bit memory access can occur as fast as possible, while still providing 8- and 16-bit standard-bus slots.

A 20-MHz 80386 chip sits at the heart of the system. One megabyte of 80-nanosecond RAM is standard, with performance improved using 32K of 35-nanosecond RAM controlled by an Intel 82385 high-performance cache controller. Flopping point can be enhanced by installing either an Intel 80387 coprocessor or the Weitek 3167 coprocessor.

Like its predecessor, the 20e comes with a 1.2-megabyte floppy drive. Compaq also offers versions of the system with 10-megabyte 29-nanosecond hard disk or a 110-megabyte 25-nanosecond hard disk. (The regular-size Compaq 386/20 uses a 60-megabyte drive as its minimum configuration.) The 386/20e controller offers 1:1 interleaving to improve sequential access performance. You add either a 1.2-, 1.4-, or 1.6-megabyte floppy drive or tape backup of 40- or 135-megabyte capacity.

Need more hard disk space? You can add 300 or 600 megabytes using the Compaq Fixed Disk Drive Expansion unit.

The system board has all the common interfaces built onto it: one serial port, one parallel port, a VGA controller, keyboard port, and auxiliary (mouse) port. It also has the floppy and hard disk controller built on. Memory sits on a board in its own special slot, which leaves all four 8-/16-bit slots on the system board open. (The now-discontinued, larger 386/20 offered two additional 8-bit-only slots. This and the larger minimum hard drive are the main functional differences between the two systems.)

Compaq provides a LIM 3.2 (not 4.0) memory manager and a disk cache program with the system. MS-DOS 3.11, OS/2, and Xenix/386 are available separately. The keyboard uses the standard enhanced AT-style layout.

PERFORMANCE:

The Compaq Deskpro 386/20e has all the power of its older and larger sibling, yet this zippy workstation takes less space.

When we ran the *InfoWorld* Auto-bench Hardware Benchmark System 2 on the 386/20e, it reported the same CPU index (5.4) as the Compaq 386/20 — as we expected. Sequential hard disk access on the Compaq 20e's 40-megabyte drive rated a swift 3.6, compared to the older system's mere 1.4 on its 60-megabyte drive; the random hard disk access index was 2.9 compared to the other system's 3.7.

Hard disk performance has been steadily improving; the improved con-



Compaq's 20-MHz 386/20e can handle up to 16 megabytes of 32-bit RAM without using a slot. This leaves all four AT-compatible 16-bit slots open for options.

A Smaller Compaq System That Packs the Same Punch

The 386/20e trades off two slots for a smaller footprint and all the power of a full-sized 386.

BY STEPHEN SATCHEL, DIRECTOR OF HARDWARE TESTING

troller contributed markedly to the 386/20e sequential performance. As is common with these systems, improved sequential results trade off against reduced random access results. We rate CPU and sequential access performance excellent, and random access performance earns a rating of very good.

Software and hardware compatibility have no major problems. We put the 386/20e through its paces by running Crockstalk XV; Desview 2.01; Windows 386 running Lotus 1-2-3, 2.01 and Microsoft Word 4.0; Sidekick Plus; Compaq's OS/2 running 1-2-3, 2.01 in the compatibility box; and the OS/2 version of Rbase, Autocad 9.0, Dbase III Plus, and Paradox/386. We also installed a Hayes Smartmodem 2400B, Ethernet board, Token Ring board, and the Video Seven VGA card. The only fiddling we had to do was to resolve a conflict between the two networking cards — and that isn't Compaq's fault. Hardware and software compatibility are both excellent.

With a smaller-footprint system, expandability usually suffers. To counter

this, Compaq put as many functions on the system board as possible: VGA adapter, hard disk controller, floppy disk controller, serial port, parallel port, and mouse port. The system can handle up to 16 megabytes of 32-bit RAM without using a slot. This leaves all four AT-compatible 16-bit slots open for options.

Compaq elected not to provide any 8-bit XT-compatible slots, which is much less of a problem with the decline in the number of older boards whose physical design required an 8-bit-only slot.

As IBM did in the PS/2 systems, Compaq has replaced the electrical portion of the key lock with a BIOS-resident password system; the key lock now just secures the system cover. Only keyboard access is locked out. The machine will still reboot and run without the password — a convenience when using the system as a network file server.

Four mounting positions let you install up to 110 megabytes of disk capacity and a tape backup unit. We rate the expandability very good; only the lack of two 8-bit slots keeps the 386/20e from

scoring higher.

DOCUMENTATION:

Documentation is supposed to tell you four things: how to set up your system, operate your system, fix your system if something breaks, and adjust or customize your system to fit your needs. *InfoWorld* insists the information be easy to read, easy to find, and easy to understand. We also feel the documentation you receive should be complete — no omissions or partial option packs.

The manuals for the 386/20e are typical of Compaq: well-written, with a comprehensive table of contents, index, and glossary — but incomplete. Installation and operation are well done, but troubleshooting is omitted and there are holes in the customization sections (nothing describing how to add or replace hard disks, tape, or the floating-point processor). On the other hand, Compaq long ago pioneered some innovations we would like more system vendors to adopt: stickers inside the system unit showing where switches and sockets can be found, concise descriptions of each switch, and the location of maintenance items such as the CMOS battery.

Compaq supplies a Help utility for MS-DOS so you don't have to use the manual every time you forget a detail of an MS-DOS command or utility.

For the developer and interested user, Compaq sells a technical reference that details the internal workings of the computer in great detail.

Because the otherwise wonderful documentation is incomplete, we hold the score for documentation to very good.

SETUP:

According to Compaq, when you receive your machine from a dealer the hard disk should be completely prepared with Compaq's MS-DOS or OS/2 loaded and ready to go. This reduces setup to unpacking the system unit, monitor, and keyboard; installing any expansion boards you need; and then installing your applications software. Provided your dealer does this, we rate setup very good.

EASE OF USE:

IBM-compatible desktop systems have matured to the point where differences between them are minor. Vendors have learned to do what's right and what doesn't, and conform to this ad-hoc standard.

The only operator controls on the 386/20e are the power switch and the keyboard. The only knobs are on the monitor: brightness and contrast. Everything you need is on the front of the system — no rocking around to turn the system on or off. However, if you have a lot of peripherals, you may want to use a power strip with a switch.

If you travel a lot you'll like the fact the 386/20e will automatically detect whether the line voltage is 115 or 230 volts and will adjust itself. No more need to flip a 110/220 switch.

Ease of use earns a score of good.

SERVICEABILITY:

Compaq, like Apple and IBM, believes the dealer should service the customer. If dealers were consistently good at provid-

ALSO IN THIS SECTION

Tandon Pac 286 Plus	68
Form Easy, Version 3.0 B	69
Microsoft Mach 20	70
Guide to Reviews	71

ing service we would agree. Our continuing experience, however, is that dealer support varies from better than the factory to worse than a grease monkey at the corner gas station.

Ironically, judging from our inspection of the 386/20e, there should be few problems that couldn't be resolved over the phone by the vendor. The system is ruggedly built, with careful attention to the little details. To the extent that we disassembled the system, we found no cuts, jumpers, added components, or other evidence of last-minute changes. We judge workmanship excellent.

The warranty is the standard one-year guarantee. Expect a delay should you try to contact Compag Computer relations. We were told there is a five-day hold on call-in questions to encourage customers to get support through the dealer. (A company spokesman denied that this was official policy.)

Our experience is it's best to find a

Compag owner who can recommend a dealer from personal experience. Fortunately, there are enough dealers that you are able to shop around. Because of the dealer-only support, we rate support policies poor.

Getting technical support on new Compag products is always an interesting experience. One improvement: The dealer technical people had information about the 386/20e and could talk about the hardware intelligently. Unfortunately this didn't improve the quality of the answers we received about running popular software on the system.

We tried two dealers, asking them why our copies of Norton Utilities and Mac

BENCHMARKS

INFO
WORLD

Compag 386/20e

	Compag 386/20e	Compag 386/20
CPU	5.4	5.4
Sequential access	3.6	1.4
Random access	2.9	3.7

Test results relative to the 6-MHz (Model 099) IBM PC AT as 1.0. Autobench CPU test measures main processor performance; hard disk performance is tested for sequential and random data access. Higher numbers indicate better performance.

SOURCE: INFOWORLD AUTOBENCH HARDWARE BENCHMARK SYSTEM 2

REPORT CARD INFO
WORLD

PERFORMANCE COMPUTER

Compag 386/20e

Criterion	(Weighting)	Score
Performance		
CPU speed	(75)	Excellent
Disk access		
Sequential access	(50)	Excellent
Random access	(50)	Very Good
Software		
compatibility	(150)	Excellent
Hardware		
compatibility	(125)	Excellent
Expandability	(75)	Very Good
Documentation	(50)	Very Good
Setup	(50)	Very Good
Ease of use	(50)	Good
Serviceability		
Workmanship	(50)	Excellent
Support policies	(50)	Satisfactory
Technical support	(100)	Poor
Value	(125)	Satisfactory
Final score		7.6

PRODUCT SUMMARY

Company: Compag Computer Corp., 20555 FM 149, Houston, TX 77269-2000; (713) 370-0670.
List Price: \$7,418 (as configured).
Features: 20-MHz, zero-wait-state 80386 CPU; one serial port; one parallel port; support for 80387 or Witek 3167; 192-watt power supply; battery-powered clock/calendar; MS-DOS 3.31.
Peripherals: Enhanced keyboard; VGA board and color monitor.
Storage and Memory: 40-megabyte hard disk; 1.2-megabyte 5¼-inch floppy; 1 megabyte of RAM.
Support: One-year warranty.
Pros: Outstanding CPU and hard disk performance for less money; excellent workmanship.
Cons: Expensive compared to other vendors; no vendor-provided technical support.
Summary: Sacrifice two slots and accept a smaller but faster hard drive and you can save \$2,000 over the standard Compag 386/20.

One solution to three



The new IBM PS/2 Model 30 286.

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BENCHMARKS INFO
WORLD

Compaq 386/20e

Integrated Throughput Test

Dbase III Plus	11:32
Lotus 1-2-3	1:25
Autocad 9.0	0:37
Word Perfect 5.0	1:52

Integrated Throughput Test results given in minutes:seconds; lower numbers indicate better performance.

Utilities wouldn't work on this system. One gave us the right information (this machine's disk drive is incompatible with the most common version of these analytical programs), the other didn't. The bad news is that the dealer who was right took more than half an hour to figure out the answer.

Trying to call Compaq directly, while posing as a user rather than a reviewer, we met with a stone wall: Customer relations refused to let us speak to anyone with technical knowledge and would only state that they do not support Norton Utilities.

Offsetting this somewhat is the fact that the Compaq systems are reliable, so you don't need to get them fixed very

"If you are looking for a bargain, don't look at Compaq; the company's systems are priced right at the top of the market along with IBM."

often. Once you get things working, you shouldn't run into severe problems that the dealer can't fix. We recommend, however, that you make sure all your software works before accepting the machine. As we found out with Norton

and Mace Utilities, if you run into a compatibility problem, Compaq won't help in troubleshooting it.

The real losers are users trying to get their systems working with their software. This is intolerable; we rate Compaq's technical support poor.

VALUE:

If you are looking for a bargain, don't look at Compaq; the company's systems are priced right at the top of the market along with IBM. But unlike IBM, Compaq's systems sell for close to list price. On the other hand, Compaq makes solid systems and, except when it runs into problems with a supplier, its systems are some of the most reliable in the business.

Compaq wants \$6,599 for the most usable configuration — the 386/20e with a 40-megabyte hard disk. This compares well with other name-brand computers in a similar configuration. Add a VGA color monitor (\$699) and MS-DOS 3.31 (\$120) — which brings the configuration price up to \$7,418 — and you have a powerhouse system that doesn't take up much room, though it does leave a hole in your wallet. The discontinued full-sized Compaq 386/20 in its standard configuration (six slots, 60-megabyte SCSI hard disk drive instead of a 40-megabyte drive, 2 megabytes of RAM, and VGA monitor) had a hefty list price of \$9,346. With the 20e, you save \$2,000 and some desk space, sacrificing only two slots and a megabyte of RAM.

If you don't need this much power, there are far less expensive systems that will do the job. If you do need this much power, this system is a good buy, especially if you are short on desk space. We rate value satisfactory. □

of your biggest needs:

Power

Now you can get a lot more work done in a lot less time.

Not only can the new IBM Personal System/2® Model 30/286 run your DOS applications, it can run them fast. In fact, it's a system that's up to twice as fast as the popular PS/2® Model 30, thanks to its advanced technology and 286 chip.

What's more, as your needs grow, so can your system. Its power can be extended by adding up to 4Mb of memory right on the system board.

It's a high performance system without a high price tag.

Affordability

The new Model 30/286 comes with many standard features that are optional on other systems in its class. For example, dazzling VGA graphics, as well as printer, communications, and mouse ports are all built into the system, so option slots are free for other uses. You also get a performance-boosting disk cache to help "turbo-charge" some of your applications.

And, of course, you get PS/2 quality and reliability, which helps make short work of your long-term decision.

One other small feature comes standard, too. The Model 30/286 costs less than you might expect, which makes it an affordable choice for everyone.

And, since this system works with much of the software and hardware you may already have, you'll be getting the most from your IBM investment.

Compatibility

The new Model 30/286 runs most of the DOS applications you use today, like Lotus 1-2-3®, Display Write®, Microsoft® Works and dBase®. It accepts a variety of PC AT® expansion cards, and like the other entry level PS/2 models, many PC and PC XT™ cards as well.

Yet the Model 30/286 fits right in with the rest of the PS/2 family. It can communicate with the most advanced personal systems and can be configured to run IBM's OS/2™ versions 1.1.

For complete details about the Model 30/286 or any of the more advanced members of the PS/2 family, contact your IBM Authorized Dealer or IBM Marketing Representative. For a dealer near you, call 1-800-IBM-2468, ext. 101. You'll find that the new Model 30/286 is an investment that's *right for today, ready for tomorrow.*

Autobench Update Shows 80386 Power

With this issue we introduce Version 2 of the InfoWorld Autobench Hardware Benchmark System, an update designed to take into account the additional performance powers of processors based on the Intel 80386 processor.

The 80386 offers application programmers the opportunity to improve performance even within the confines of MS-DOS. Applications like Lotus 1-2-3 that were developed before the 386 became widely available don't take advantage of this potential power boost, but other applications such as Paradox 386 are coded to make better use of the 386 on-chip cache.

Autobench 2 gives a more accurate picture of the potential power of 80386-based MS-DOS computers. You'll see this power reflected in applications written to take full advantage of the 386; older applications will perform somewhat slower in CPU-intensive activities than the Autobench figures would suggest. This will be evident only in 386-based MS-DOS systems, and only in the CPU index results. Hard disk results remain unchanged.

Personal Data Pac by Tandon: Removable Hard Drives

Winchester speed and Bernoulli reliability are packaged together.

BY STEPHEN SATCHEL
DIRECTOR OF HARDWARE TESTING

Removable hard disk drives are an attractive idea. Hard drives are typically your spacious storage and high performance, but they are typically fixed in place; data is easily transferred, and you're always filling them with data. A removable hard drive makes it easy to:

- Transfer large amounts of data quickly and easily. Transmitting 10 megabytes by modem takes at least three hours at 9600 bps and a full day at 1200 bps. Removable hard disks can be copied quickly.
- Back up data at hard disk speeds.
- Secure data by locking up the disk cartridges.

• Maintain several large data files in situations where all files don't need to be accessible at once.

One approach is Syquest's removable Winchester hard disk platter, which suffers from durability problems. Another is the Bernoulli Box II, which is impervious to shock or dust but has been expensive, somewhat slower than comparable drives, and wears out its media rapidly.

Now Tandon offers a system that combines the speed and capacity of a removable hard-disk Winchester with the reliability of the Bernoulli, in a package whose base price is quite low — though the media is expensive.

FEATURES:

The Tandon Personal Data Pac removable drive subsystem consists of two pieces: the Data Pac removable media, which includes the drive mechanism and is shock-mounted inside a rugged ABS plastic shell; and the drive receptacle, which contains most of the drive's electronics. By including the drive in the removable media pack, Tandon added reliability; by splitting the electronics from the drive, Tandon reduced the cost of the removable media.

The Tandon Personal Data Pac system has a capacity of 30 megabytes and an average effective access time of 40 milliseconds, according to the vendor. Each Data Pac weighs 2.6 pounds (1.2 kilograms).

The Data Pacs were meant to be transported and Tandon went to great lengths to protect your data. The case and shock mounting are designed to protect the disk drive from the effects of an 18-inch drop onto a hard floor — or a 24-inch fall onto carpeting.

In addition, when the Tandon drive packs its heads, it lifts the heads off the surface of the disk (most hard disks leave the heads sitting on the magnetic coating of the platters). Tandon claims this Winchester drive is the first to lift the heads off the media.

Tandon assigns a serial number to



Tandon Pac 286 calls for commitment to the vendor's hard disk technology.

each Data Pac and writes it to a protected portion of the disk along with a media flag table so formatting software avoids the bad spots already identified at the factory; the user does not have to key the numbers.

The Tandon removable system comes in two forms: The first is the Ad-Pac drive subsystem, a complete package that lets you retrofit your existing desktop computer with the Tandon system. The package consists of the removable Tandon Personal Data Pac, one or more external drive receptacles, and one of three RLL controller cards: an 8-bit XT, 16-bit AT, or 16-bit PS/2 MCA. A cable connects the receptacle cabinet to the controller card. The controllers come standard with a 128K hardware disk cache buffer.

The other form is a complete Tandon desktop computer system with built-in Tandon Personal Data Pac. Possible configurations include: the 8-MHz Tandon Pac 286 or 10-MHz Tandon Pac 286 Plus, both with two receptacles; and the 20-MHz Tandon 386, with one receptacle and a 110-megabyte fixed hard disk.

The Tandon Personal Data Pac provides high-speed data backup capabilities. With the two-receptacle system, you can make an image of one Data Pac on another.

If you have another hard disk in the system, you can use MS-DOS Copy and Xcopy commands to back up your data at hard-disk speeds. Since the drives are fully sealed Winchester drives, they don't suffer from the media wear problems of the flexible-disk Bernoulli mass-storage removable drive system.

PERFORMANCE:

We evaluated both the Ad-Pac single-drive add-on subsystem and the 10-MHz Tandon Pac 286 Plus desktop computer with integral Data Pac drive.

Compared with other 10-MHz 286-based systems, the Tandon desktop held its own. The system's CPU performs respectively, with a benchmark index of 2.08. CPU performance earned a good rating.

The Tandon disk spins at 3600 rpm, the same speed as standard fixed disks. The Data Pac uses RLL recording, which allows Tandon to put 24 sectors on each track instead of 17. Therefore, large sequential reads (such as those done by spreadsheets, word processors, and graphics programs) transfer data roughly 40 percent faster than a comparable drive. The drive measured 1.77 for sequential access performance and 1.28 for random performance. Comparable 10-MHz 286 systems reviewed in our July 25 comparison ranged from 1.38 to 2.31 for sequential access and 1.65 to 2.12 for random access. We rate the Tandon satisfactory in both.

When we installed the Ad-Pac system in an IBM PC AT Model 339 (an 8-MHz 286 system) the InfoWorld Automated Benchmark System measured 1.65 for sequential disk access performance and 1.05 for random access performance. The drive is slower when in the 8-MHz AT than when in the 10-MHz Tandon because of the difference in CPU speeds.

When we compare the Ad-Pac's numbers with those for the IBM-supplied drive in the same 8-MHz system (1.17 for sequential access and 1.40 for random access), the Data Pac works well in sequential access — with programs that read files straight through, such as spreadsheets, word processors, and graphics programs. (The 6-MHz IBM PC AT 099 scores 1.0 for all tests.)

We rate hard disk performance for the Tandon Ad-Pac drive subsystem satisfactory for both sequential and random access.

The Tandon 286 desktop system proved to be compatible with our standard software and hardware test suite, earning a very good score for compatibility. (Tandon does not claim OS/2 compatibility, so we didn't test it.)

When we first received the Ad-Pac add-on subsystem, we couldn't get it to work in any system in the InfoWorld Test Lab. We called Tandon; the vendor

replaced our RLL controller board and fixed the problem. The replacement board disables zero-wait-state access for ROM calls, which some systems can't handle properly.

After we made the change, the board worked well in a variety of systems, including 25-MHz 386 systems. The Ad-Pac subsystem earns a good score for hardware compatibility. This score could have been higher if the disk worked properly with the original IBM PC AT 099 (you have to update the BIOS ROM in order to use the Tandon controller in this system).

We had little trouble expanding the desktop computer system. You can add 4 megabytes to the system without using any of the four 16-bit slots or the 8-bit slot. Although the 125-watt power supply is small by PC standards, it is more than adequate for all but the most power-hungry peripherals.

The vendor predicts a 50-megabyte system before long. The only thing left on our wish list is a second 8-bit slot. We

REPORT CARD INFO WORLD

PERFORMANCE COMPUTER

Tandon Pac 286 Plus

Criterion	(Weighting)	Score
Performance		
CPU speed	(75)	Good
Disk access		
Sequential access	(50)	Satisfactory
Random access	(50)	Satisfactory
Software compatibility	(150)	Very Good
Hardware compatibility	(125)	Very Good
Expandability	(75)	Very Good
Documentation	(50)	Very Good
Setup	(50)	Good
Ease of use	(50)	Good
Serviceability		
Workmanship	(50)	Very Good
Support policies	(50)	Satisfactory
Technical support	(100)	Good
Value	(125)	Satisfactory
Final score		6.4

PRODUCT SUMMARY

Company: Tandon Corp., 405 Science Drive, Moorpark, CA 93021; (800) 556-1234, (800) 441-2345 in CA.
List Price: \$3,199

Features: 10 MHz, one wait state, 80286 CPU; 1 serial port; 1 parallel port; 80287 coprocessor support; 125-watt power supply; UIM EMS 4.0 driver; MS-DOS 3.2; GW Basic; Microsoft Windows 286.

Storage and Memory: 360K floppy; dual 30-megabyte Tandon Data Pac receptacles with removable media.

Support: One-year warranty; dealer-supplied service.

Price: Very good hardware and software compatibility; very good documentation; rugged construction.

Cons: Slightly more expensive than other 80286 systems.

Summary: An 80286 system designed to take advantage of Tandon's removable hard disk technology.

BENCHMARKS

Tandon Pac 286 Plus

	Tandon Pac 286 Plus (10 MHz)	Ad-Pac on IBM AT 339 (8 MHz)	AT Premium/286 (10 MHz)
Autobench:			
CPU	2.08		2.25
Sequential access	1.77	1.65	1.38
Random access	1.28	1.05	2.12
Integrated Throughput Tests:			
Dbase III Plus	15:53		12:31
Lotus 1-2-3	4:49		4:02
Autocad 2.6.2	5:07		4:10
Word Perfect 5.0	4:11		3:35

Autobench, Version 1.04 test results relative to the 6-MHz (Model 099) IBM PC AT as 1.00. Autobench CPU test measures main processor performance; hard disk performance is tested for sequential and random data access. Higher numbers indicate better performance. Integrated Throughput Test results given in minutes:seconds; lower numbers indicate better performance.

SOURCE: INFO WORLD HARDWARE BENCHMARK TEST SYSTEM

score expandability very good.

DOCUMENTATION:

The manuals provided with the Tandon Pac 286 and the Ad-Pac subsystem are among the best we've seen. The documentation did exactly what documentation should: tells you how to install, use, customize, and fix the products.

The manual for the Tandon Pac 286 contains everything you need to know to install and use the system. The troubleshooting section is complete and very useful. We liked its clear writing style and the comprehensive index and table of contents. We rate it very good.

The two manuals that come with the Tandon Ad-Pac subsystem are deceptive. They are very comprehensive. The installation section uses many pictures to make the process clear and almost foolproof. The description of how to use the Data Pacs with the drive is clear. Like the Tandon Pac 286 manual, it has a complete and useful troubleshooting section, index, and table of contents. It is significantly better than the documentation we have seen for most other disk drive subsystems. We rate documentation for the Ad-Pac subsystem excellent.

SETUP:

Setting up the Ad-Pac subsystem is easy if you follow the instructions in the manual. You plug in the controller board, connect the receptacle to the keyboard using the cable

supplied, and install the software driver. We were disappointed that Tandon didn't provide a program to automate this step; you have to edit your Config.sys file yourself, but the line you add is simple and well-documented. The Ad-Pac system setup rates a very good.

Setting up the Tandon Pac 286 desktop is just a matter of unpacking everything, plugging it together and connecting the system. Tandon has already installed MS-DOS in the Data Pacs provided with the Pac 286.

The 1.2-megabyte floppy drive is not connected to the system, but connecting it is a breeze. You use clips to hold the drive in place instead of screws. Setup for the Pac 286 is rated good.

EASE OF USE:

The Data Pacs are simple to use. With system power on, you insert the Data Pac into the empty receptacle until the drive captures it and pulls it home. The drive then starts up automatically. When you eject the system, it goes back to the ready state. The system automatically ejects the Data Pac when you push the heads, and pushes the drive so you can pull it out the rest of the way. Unlike other disk systems that insist you push the disk in all the way, the Personal Data Pac completes the connection between the drive and the receptacle for you.

You can self-diagnose failures from the keyboard, use the initial start screen, or run a supplied utility program to eject your Data Pacs. However, there is no way to remove a disk without power; Tandon says this is a security feature that prevents someone from removing a Data Pac.

The Pac 286 system is a minitower that can sit on your desk. The power switch is on the front, and the reset switch is well protected.

The Ad-Pac drive and Tandon Pac 286 both rate good for ease of use.

SERVICEABILITY:

We wanted to find out just how rugged the Personal Data Pac is, so we shipped Data Pacs around the country by UPS. We also put a Data Pac in checked luggage for a transcontinental trip and dropped them on the floor a few times. Despite this punishment, we didn't experience any job-related failures. We also had no trouble trading Data Pacs among several drives in different locations.

Tandon had to replace one unusable Data Pac; ironically, it was not one of the tortured Data Pacs. The bad Data Pac failed very early in our testing; we judged this to be a sampling error. The Ad-Pac is a simple device: a sealed chamber with a drive motor and head and a small printed circuit board with some of the drive's electronics. The receptacle holds the remainder of the electronics circuitry. The design and workmanship were as clean as we expect from disk vendors.

We found it very difficult to take the Tandon Ad-Pac drive receptacle apart. It was it well worth the work. The single-printed circuit board uses surface-mount components. There is more room between parts since the board doesn't have to fit inside the confined space of the drive itself. The revision H board had a handful of wires and three components (transistor, resistor, and capacitor) tacked onto the board. This should have little impact on the reliability of the receptacle — the workmanship on the changes is superb.

The Tandon Pac 286 showed no last-minute changes and was ruggedly built. We've come to expect this from the current generation of 286 systems. Both products earn a very good for workmanship.

Both the Tandon Pac 286 and the Tandon Ad-Pac subsystem carry one-year warranties. The Personal Data Pac carries this warranty for the same period as well. Support is supplied by your dealer, although we were able to get help directly from Tandon. We score support policies satisfactory.

Technical support varies for the two products. Fewer things can go wrong with a disk subsystem than with a complete 286 system. Support for the Tandon Pac 286 system was good, with the technicians giving us quick, accurate answers to our questions. We rate technical support quality for the desktop unit good.

We had real trouble with the Ad-Pac subsystem, which gave the technical support staff a chance to show what they could do. The board wouldn't work in a number of systems. Repeated calls elicited a "try this, try that, did you try so-and-so" from the technicians. Several days later Tandon called our editors and said the RLL controller board had to be changed. The change caused the Ad-Pac drive to work with anything except the original IBM PC AT 099.

The support technicians demonstrated a strong knowledge of the product when they tried to help us make it work. We rate technical support on the Ad-Pac

subsystem very good.

VALUE:

The 10-MHz Tandon Pac 286 Plus with a two-drive Personal Data Pac subsystem has a list price of \$3,199. Remember to add two 30-megabyte Data Pacs, which raises the cost to \$3,997, a monitor, and a display adapter. The result is a bit expensive for a 10-MHz system, though it compares well to some name-brand systems like the AST Premium/286. We rate the Tandon Pac 286 a satisfactory value.

The single-drive Tandon Ad-Pac subsystem is more of a bargain at \$599, plus \$399 for a removable 30-megabyte Data Pac. In short, your first 30 megabytes cost you just under \$1,000. This compares to its most direct competition, the new Bernoulli Box II, which for \$1,100 offers an internal 20-megabyte removable drive (\$2,350 for a pair of 20 megabyte platters). (See product comparison September 5, 1988, and also review November 5, 1987.) Tandon's media cost is higher, at \$399 per cartridge, compared to Bernoulli cartridges at \$83, but Bernoulli cartridges wear out quickly, requiring frequent replacement. Tandon offers more durable media, somewhat higher performance, and higher storage capacity. We rate the Tandon Ad-Pac a very good value. □

Form Easy's Capabilities, Simplicity Make It Stand Out

Forms creation, editing package gains value from database, Lotus graphics file merging.

BY ALBERT MAY REVIEW BOARD

Form Easy, published by Graphics Development International, is intended for those in a forms-intensive environment, i.e., for those who design, manage (or edit), and fill in forms of every kind.

Since many users will want to complete forms from existing data sources, the program has the flexibility to import files from various word processors, databases, and spreadsheets. You can also import graphics files from Lotus and PC Paintbrush as well as use Form Easy's scanning module to bring in images and do simple editing. As a result, Form Easy allows the user to create screens that interface with various databases files, and printing of forms with or without data on several popular laser and dot-matrix printers. The program is especially useful for designing copyable or camera-ready blank forms.

FEATURES:

Form Easy, Version 3.0B contains four disks and an instruction manual. Also included are 17 sample forms along with eight sample source documents for the tutorial to be merged with the various forms. The software and manual contain a tutorial that opens with the start-up of Form Easy and continues through each of the functions. A macro capability allows the user to embed a command to print a database query onto a form in a batch procedure. This enables the merging of data onto forms directly from DOS or from any database, edited when necessary, and printed on the selected printer.

Form Easy requires 512K of memory, DOS 2.0 or later, and a hard disk for the full package. A run-time version can operate on floppies. Color graphics capability is another significant enhancement

to earlier versions. Although it is primarily designed for use with laser printers to take advantage of varying fonts, a dot-matrix printer with enhanced capability also works. We viewed output on both an HP laser printer and a nine-pin Epson dot-matrix printer.

Form Easy is available in a run-time version (\$295) for users once forms and relational database files have been defined. The run-time version allows the user to access any saved form, enter the information, and print it; but it does not allow modification or creation of forms or databases.

PERFORMANCE:

Form Easy has five operations that can be selected from the main menu: editing a form, filling a form, merging information onto a form, changing printer selection, and exiting to the operating system.

Selection of the edit function allows modification to any of the existing forms, as well as creation of new forms of any type. This option gives the user access to all the word processing and form design functions in the package. A significant library of forms can be stored with a minimum of effort.

When the user selects the form fill option, a form is selected from the library and the form is displayed on the screen. Then type data onto the form and print it. The merge option enables the user to merge an existing form with a data file, thus allowing a series of forms to be printed with the data from the file.

To provide quick access to information about the form, a window appears at the top of each screen with a status line at the bottom. The compiled forms are stored in the printer, eliminating the necessity to download them each time they are used in any application.

A note in the manual states it was

REPORT CARD INFO WORLD

REMOVABLE HARD DISK

Tandon Personal Data Pac

Criteria	(Weighting)	Score
Performance		
Sequential access (100)		Satisfactory
Random access (100)		Satisfactory
Hardware		
compatibility (100)		Good
Documentation (75)		Excellent
Setup (125)		Very Good
Ease of use (50)		Good
Serviceability		
Workmanship (100)		Very Good
Support policies (50)		Satisfactory
Technical support (50)		Good
Value (250)		Very Good
Final score		6.8

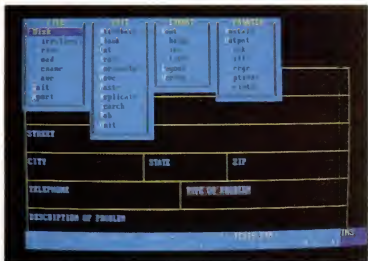
PRODUCT SUMMARY

Company: Tandon Corp., 405 Science Drive, Moorpark, CA 93021; (800) 556-1234, (800) 441-2345 in CA.
List Price: \$599 (Ad-Pac), \$399 (Personal Data Pac).
Requires: IBM AT or compatible; MS-DOS 3.0.

Pros: Very rugged removable hard disk structure; performance comparable to fixed hard disks; excellent documentation.

Cons: High cost of media; can't remove media if power is off.

Summary: High in media reliability, with respectable performance, the Tandon Ad-Pac is a good hard drive system that only charges a modest increment for the bonus of removability.



Form Easy's menus are always available and access all program features.

created, edited, and printed using Form Easy. It's a laser printer, with the program's word processing capabilities. Form Easy flawlessly performed as advertised and as stated in the user manual. Its capabilities, especially to easily create lines and boxes, place its performance in the top class. We find performance very good.

DOCUMENTATION:

Form Easy's documentation comes in a hardcover book with four 5 1/4-inch diskettes. It offers a basic table of contents and index. The first appendix in the manual is a 10-page quick-reference guide for the various keys and commands used with this software. On-line help screens are available throughout the program, and we found them easy to

access and understand. The user manual is clearly written in a non-technical vocabulary and is very easy to read.

Since this package makes use of the many capabilities of the various laser printers, there are several sections in the documentation devoted to these printers and their particular requirements. The manual discusses dot-matrix printers as a single class.

Part I of the user manual explains each of the functions of Form Easy. Part II contains the commands and function keys. The 26-page tutorial contains nine lessons and two examinations to be completed and then finishes with a "final examination." Each lesson has a "required reading" the appropriate section of the user manual. Each examination uses a form or source document and is designed to provide a practical application to reinforce the procedures that were explained.

The only thing preventing a higher score is that the manual looks a little straight out of a laser printer, with few graphics or highlights for key features. We rate documentation good.

EASE OF LEARNING:

Any user, regardless of experience with forms software, must have a reasonable understanding of the laser printer and its fonts. A user who is not experienced with forms design will no doubt take longer to become familiar with the various aspects of layout than one who has constructed forms previously.

The actual installation is accomplished by one command and a response to several prompts. We took about 20 minutes to get going, and novices should be running within an hour. The tutorial takes another two hours. Because of the capability for inexperienced users to make rapid use of the package, we find ease of learning very good.

EASE OF USE:

The excellent use of menus and function keys throughout Form Easy offers a very responsive package. As we grew more familiar with the package, the use of the function keys, as well as the all-key combinations, enabled us to rapidly complete our work.

The novice can easily fill and merge forms if the data files either exist and are easily accessible or can be easily constructed by the user. Another bonus is the capability to place text and then create a box around it afterward. In some packages you must select your boxes and lines first and then make the text fit inside of

them.

Because this is one of the easiest software packages on the market in which to construct and complete forms, we rate it very good in ease of use.

ERROR HANDLING:

This software package has minimal error-handling capabilities. After creating a form, for example, you can designate each field as alphabetic or numeric and specify the minimum and maximum values. There are several standard error messages, including Change Carriage, Copy Proper Table, Not Enough Memory, File Doesn't Exist, and No Printer. The run-time version operates as a security module and does not allow edits or changes.

Form Easy won't tell you, however, if your printer choice is incorrect. If your printer fails to work or you get garbage on the page, your resources are either to turn the power off and on or to reselect the printer.

If you lose power or crash, you'll lose your work since the last save, but you can't damage your source data files. It is possible to edit your database files from Form Easy but only by saving the data. That preserves data integrity. The program prompts you to save your work when you quit.

Fortunately, there's not much to go wrong here; we find the error-handling capabilities of Form Easy satisfactory.

SUPPORT:

The vendor offers a 90-day warranty that guarantees the software will operate as described in its manual and advertising. There is an extended support program for corporate customers. Buyers get free phone support for 90 days. Support hours are Monday through Friday from 8:30 a.m. to 5 p.m. Pacific time. The technical support section does not have a toll-free number. We rate support services good.

We made several calls to the Form Easy support services and just once had to leave a message, which was returned within 30 minutes. In each case the technical support staff rapidly provided an accurate answer. The technicians appeared to have a fine knowledge of the product and were able to provide helpful hints for solving the problems. We rate technical support good.

VALUE:

Creating new forms or customizing those provided in Form Easy requires some knowledge of forms construction and use, but this program's simplicity allows the user to standardize both procedures and written presentation of information throughout a company. This product will help users prepare finished forms for reproduction, as well as merge database files to print out completed forms. The capability to incorporate Lotus graphics and files from various word processors into a single document further increases the value of this package to the average business.

Form Easy costs \$495 and is a fine addition for those who create, manage, and complete forms, as well as for those who incorporate complex text from various sources into a single document. For those who create and process a number of forms in-house, the program will probably save them a lot of money. We rate it a very good value. □

Albert May is a former chief operating officer for a national employment tax company. He has been involved with personal computers in business since 1975.



The Mach 20 upgrades a PC or XT CPU to an Intel 80286 running at 8 MHz.

With Mach 20 PCs, XTs Can Now Run OS/2

Accelerator board has options but not speed.

BY GREG SMITH
INFOWORLD TEST CENTER

FOR PC or XT owners determined to run OS/2 on their present machines, the Microsoft Mach 20 accelerator board provides a solution: a complete package that gives you 80286 power, all the memory you need, a mouse port, a floppy controller for newer, higher-capacity floppy drives; and, of course, OS/2 compatibility. And all this fits on one card so that if you replace your current floppy controller, you end up with the same number of available 5 1/4-inch floppy drives.

Offsetting these nice features is the fact that Microsoft's Mach 20 accelerator board isn't terrifically fast.

FEATURES:

The Mach 20 upgrades a PC or XT CPU to an Intel 80286 running at 8 MHz. Microsoft also includes an on-board slot for an optional 80287 math coprocessor. To minimize cost, Microsoft designed the Mach 20 to rely on the host computer's memory. The board's 80286 chip was designed for a 16-bit data bus, but because pre-AT machines were designed around an 8-bit bus, accessing the motherboard's memory can choke performance. To reduce delays while fetching information, 16K of zero-wait-state memory (on the board's internal 16-bit bus) is included for caching.

A Microsoft Inport controller is integrated into the basic Mach 20 board, which allows an Inport module to be plugged directly into the basic card — sparing a serial port.

Microsoft also offers a Disk Plus option board that supports, in addition to the standard PC or XT 5 1/4-inch 360K floppy drive, a higher-capacity AT-style 1.2-megabyte drive as well as 3 1/2-inch 720K or 1.44-megabyte PS/2-style floppy drives. Because this board also plugs directly into the Mach 20, it frees the slot currently occupied by your floppy controller.

For users contemplating a move to OS/2, Microsoft offers a version of its Standard Edition OS/2 customized for the Mach 20, which sells for \$325. Like other implementations of Microsoft's OS/2, this one offers a dual-boot feature that allows users to install OS/2 in addition to their current version of DOS.

PERFORMANCE:

The Mach 20 boosts an XT's CPU speed and functionality to match that of an 8-

REPORT CARD INFO WORLD

FORMS SOFTWARE

Form Easy

VERSION 3.0B

Criteria	(Weighting)	Score
Performance	(400)	Very Good
Documentation	(80)	Good
Ease of learning	(40)	Very Good
Ease of use	(120)	Very Good
Error handling	(80)	Satisfactory
Support		
Support policies	(40)	Good
Technical support	(40)	Good
Value	(200)	Very Good
Final score		7.1

PRODUCT SUMMARY

Company: Graphics Development International Inc., 20-C Pimentel Court, Suite 4, Novato, CA 94949; (415) 382-6600. **List Price:** \$495.

Requires: IBM PC, XT, AT; 512K of RAM; DOS 2.0 or later; hard disk.

Pros: Easy-to-use menus; good tutorial; good tech support; useful word processing functions.

Cons: Limited error handling; manual could benefit from graphics.

Summary: Ideal for forms-intensive companies doing lots of in-house work.

MHz IBM AT (Model 339). On the *InfoWorld* Hardware Benchmark System, this board scored a 1.42 in CPU performance — comparable to the IBM AT that scored 1.37.

The Mach 20 did not do much for the XT's poor hard disk performance; it scored a 0.59 on the sequential hard disk test and 0.96 on the random hard disk test — almost exactly the same as the standard XT's scores and significantly lower than the IBM AT's scores of 1.17 and 1.40 respectively.

If users purchase the Microsoft Memory Plus board, however, they can dedicate a portion of its memory for Smartdrive, a disk-caching package. Because many of the *InfoWorld* throughput tests involve at least file loading and saving, most of the Mach 20's scores were low compared to an equivalent AT. The Word Processing/Desktop Publishing model fared the best with a less-than-average 7.00; an IBM AT running the same test scored 5.38.

Similarly, this board's spreadsheet score of 11:25 vs. the AT at 6:71, and CAD score of 8:42 vs. 6:36 for the AT were slow. Even worse, the score of 34:21 in the database test tagged in comparison to the AT's score of 18:19. The vendor claims hard disk throughput can be

improved with the use of the optional Memory Plus board. For the basic system, however, we rate the Mach 20's speed satisfactory on the basis that the accelerator does give an XT the CPU performance of an AT.

The Mach 20 breezed through our software compatibility suite. To test DOS software compatibility, we ran Crosstalk XVI, Version 3.61; Desqview 2.0; Paradox 2; Word 4.0 (in graphics mode); Sidekick Plus; and Windows, Version 2.03.

For OS/2 compatibility, we ran Rbase for OS/2, as well as Lotus 1-2-3 in the DOS compatibility box using Microsoft's OS/2 for the Mach 20. But we were unable to get the Vega VGA card to work in compatibility box. This appears to be an incompatibility between certain revisions of the Vega card and OS/2's compatibility box, rather than a problem with the Mach 20 board.

To accommodate speed-sensitive software, the Mach 20 can be toggled with a user-selectable key combination to an AT at 4.77 MHz. In the absence of any problems, we rate the Mach 20's software compatibility very good.

Likewise, the Mach 20 successfully ran with the ATI 2400 internal modem, AST Premium EMS, Video Seven Autoswitch VGA, Plus Development's Hard Card 40, 3Com Etherlink II, and IBM Token Ring cards. This problem-free performance earns the Mach 20 a very good in hardware compatibility.

The Memory Plus option board can accommodate up to 3.5 megabytes of additional memory. The Mach 20 can access this memory quickly, thanks to the Mach 20's internal 16-bit bus, which the Memory Plus board connects directly into. This additional memory can be used to backfill systems with less than 640K of conventional RAM, as extended or LIM 4.0 expanded memory. (With 512K of RAM, the Memory Plus board costs \$495.)

The versatility and capacity of Microsoft's Memory Plus board scores a very good in expandability.

The integration of the floppy controller, mouse port, memory, and accelerator card, as well as the effective memory cache and this enhancement system a one-half point for design merit.

DOCUMENTATION:

The Mach 20 documentation is short but complete. The user's guide included a nice table of contents and index; a quick-start guide for those familiar with the installation of expansion cards; and a step-by-step guide for novices that takes the reader through opening the case,

removing the processor, installing the card, and closing the case. In the booklet there are listings in two locations for the speed satisfaction and purpose of each jump on the board. For Compaq portable owners, Microsoft includes a special appendix describing installation in the Compaq's box.

The installation guides for the option boards are scant but adequate. Both supplements give a brief, illustrated discussion of how to mount the option cards onto the Mach 20. The clear writing plus substantial aids earns a very good score for documentation.

SETUP:

The on-line installation guide made it simple to set the numerous jumpers by showing users the best jumper settings for their machines. The detailed illustrations and special tool for prying out the 8088 ensure that even a novice will succeed. With a setup time of less than 15 minutes, the Mach 20 earned a very good score in setup.

EASE OF USE:

Like most add-in boards, once installed there isn't much to using an accelerator board. Memory caching can be controlled with a command-line utility and CPU speed is easily selected. This board rates good for ease of use.

SERVICEABILITY:

The Mach 20 board and its add-ons are well-designed. We were concerned about a possible grounding problem at the end of the ribbon cable, and some of the memory chips were improperly inserted. Minor defects offered benefits to limit the Mach 20's workmanship score to good.

Microsoft warrants the Mach 20 for two years. All needed repairs are made through Microsoft's repair center. Technical support is free and unlimited, but you'll have to pay for the long-distance call. We rate Microsoft's support policies good.

Technical support was accurate and easy to get. It rates a good.

VALUE:

The Mach 20 is a bit expensive at \$495 for the basic board. Similarly rated accelerator boards are available for as little as \$269.

With its option boards, however, the Mach 20 can provide more features than many competitors. Its OS/2-compatible design, rare among accelerator cards, offers an advantage to XT or PC users wanting an upgrade to OS/2. Overall, we rate the Microsoft Mach 20 a satisfactory value. □

InfoWorld Guide to Reviews

REVIEW SCORING

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent = 1.0 — Outstanding in all areas.

Very Good = 0.75 — Meets all essential criteria and offers significant advantages.

Good = 0.625 — Meets essential criteria and includes some special features.

Satisfactory = 0.5 — Meets essential criteria.

Poor = 0.25 — Falls short in essential areas.

Unacceptable or N/A = 0.0 — Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another offer little. Weightings represent average relative importance to *InfoWorld* readers involved in purchasing and using that product category.

You can customize the report card to your company's needs by using your own weightings to calculate the final score.

Average score (1987) for all products reviewed: 6.5.

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The editorial review board selects products for review for each cycle. If your product is selected, you will be contacted to arrange shipment of the product for review. We request two copies of software; we return hardware, but not software, after review.

Because of the volume of submissions, we regret we are unable to contact vendors regarding products not selected for review.

REPORT CARD INFO WORLD

ACCELERATOR BOARD

Microsoft Mach 20

Criteria	(Weighting)	Score
Performance		
Speed	(125)	Satisfactory
Software compatibility	(150)	Very Good
Hardware compatibility	(150)	Very Good
Expandability	(75)	Very Good
Documentation	(75)	Very Good
Setup	(50)	Very Good
Ease of use	(150)	Good
Serviceability		
Workmanship	(30)	Good
Support policies	(20)	Good
Technical support	(75)	Good
Value	(100)	Satisfactory
Bonus (design merit)		
Final score		7.0

PRODUCT SUMMARY

Company: Microsoft Corp., 16011 N.E. 36th Way, Redmond, WA 98073; (206) 882-8080.

List Price: \$495.

Features: For PC and XT compatibles; 8MHz-286 CPU; socket for 80287; optional card for up to 3.5 megabytes of 16-bit memory and for high capacity floppy controller.

Pros: Easy to install; integrates floppy controller, memory, mouse port, and accelerator into one card; OS/2 compatible.

Cons: Relatively slow and expensive compared to other accelerator cards.

Summary: An expensive accelerator card that upgrades your XT to AT performance (but no higher), the Mach 20 is of most interest to those who demand OS/2 compatibility.

BENCHMARKS

Accelerator Boards

	Mach 20* (8 MHz)	IBM XT (4.77 MHz)	IBM AT (339) (8 MHz)
Autobench scores:			
CPU	1.42	0.34	1.37
Hard disk sequential	0.59	0.55	1.17
Hard disk random	0.96	0.98	1.40
Throughput scores:			
CAD	8:42	24:59	6:38
Database	34:21	60:26	18:19
Spreadsheet	11:25	24:26	6:71
Word processing/ Desktop publishing	7:00	19:51	5:38

*Installed in an IBM XT.

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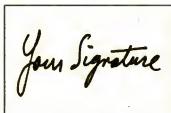


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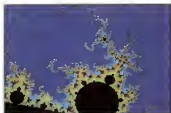
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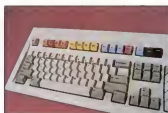


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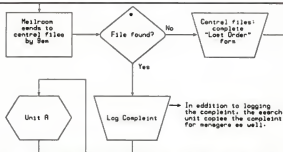
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AD INDEX

American Power Conversion	6	Imagen	37	Pacific Computer	79
Applied Microsystems	38	Intel	87	PC Designs	32
AST Research	88	Kaypro	34	PC Pro	80
BBS Systems	21	Kurtis	31	Percon	81
CMS	86	Mead	76	Practical Peripherals	16
Communication Networks	41	Micro Express	60-61	Quartetek	63
Deft Computers	56-57	Micro Solutions	22	Softlogic Solutions	45
Discount Data	78	Micro Telesis	54	Software Publishing	18-19
Everex	42-43	Microsoft	14-15	Toshiba	46-47
Fifth Generation	20	Micro Warehouse	22	Touchbase Systems	55
Firststar	24-25	Mytel	77	Video 7	10
Gibson Research	62	NEC	9	Western Digital/Paradise Systems	13
Hauptpage	53	Nortgate Computer	27-29, 74-75	Westlake Data	80
Haventree	81	Norton Lambert	4	White Crane Systems	30
IBM	2, 66-67	Oracle	7	Zenth Data Systems	51

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Microsoft Word, Version 5.0 Unveiled

BY PERRY WATT

An updated Microsoft Word, with enhanced redlining and OS/2 protected-mode support, was unveiled last week.

Word 5.0, scheduled to ship by the end of the year, also now displays graphics in a full-page Print Preview mode, said Ruth Kurman, Microsoft Word product manager. Users can resize and move images and columns of text, add borders and shading, and flow text around graphics in a new Story Layout mode.

Links to source data that automatically update charts and graphs in Word documents, now

accept database files as well as spreadsheets. Workgroup editors can now add names, dates, and times to comments, Kurman said. "You can split a document into two windows, with one for comments, and later merge all comments into one file," she said.

New "bookmarks" let users name and link document sections. Also added are an auto-save option, automatic repagination, and EMS 4.0 support. Column and tab manipulation can be automatic or user-defined, and adjusts spaces for fonts.

"The major ease-of-use

change is in designing tabs and tables, where the feedback was loud and clear," Kurman said.

Word 5.0 has network support so users need only add \$195 Node Packs for each workstation. It retains the \$450 price of the 1-year-old Word 4.0, with \$75 upgrades for users of any previous releases.

Word 5.0 runs on PC and PS/2 compatibles with 512K of RAM and DOS 2.0 or later, and supports but does not require a mouse.

Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717; (206) 882-8080.

Look

Continued From Page 1

could set up menus for other users; however, DOS programs must be run from the command prompt. Applications written specifically for the Presentation Manager and most OS/2 1.0 applications can be run within windows on the main screen, while DOS and its applications always run in full-screen windows. You move among windows by clicking on a window's title bar, or by pressing Alt-Tab, Esc, or you type Control-Esc to return to the Task Manager.

FILE SYSTEM. Presentation Manager's file system looks similar to the DOS 4.0 shell but adds some new features. The file system displays the directories within a disk or partition in a tree structure and lets you view all the files in the subdirectory in a list fashion. Within these windows, it displays an icon indicating the type of program. It optionally can show a full directory including size, dates, times, and attributes such as whether the file is a read-only, archive, hidden, or system file.

Presentation Manager's file system has several features that are somewhat surprising. As on a Macintosh, you can now select a file or a group of files and drag them into another directory,

using the mouse.

One great innovation is a new tree outlining feature. When this is turned on, you can collapse and expand your list of directories by clicking on a minus icon in front of the directory name to collapse and a plus icon to expand. This lets you control the level of detail you view, and is helpful if you have disk partitions with a large number of subdirectories.

A few functions from DOS 4.0 seem to be missing, however. It doesn't offer password protection for individual files, and it doesn't have a file-viewing facility.

TRAINING SYSTEM. Presentation Manager also comes with a computer-based training system that teaches you how to use it and the individual elements (Task Manager, Start Programs Window, and File System) all have extremely useful help files.

The user interface follows IBM's Systems Application Architecture. As in DOS 4.0, you access menus with the mouse or by using F10 or Alt to activate the menu bar. Unlike Windows, you can't hold down the Alt key while typing a menu letter.

INSTALLATION. Installing OS/2 requires installing versions of OS/2 is relatively straightforward, though it requires a fair number of disks.

technical innovation still remains a high priority.

"We seek not the lowest common denominator that will limit the future to today's constraints, but the highest possible denominator that will balance compatibility needs against new features," the statement reads.

According to Intel, the 486 chip will maintain the same basic architecture as the 386 chip but will perform at much higher speeds. (See "Intel to Follow 865X With Faster Chips," June 27.) Intel has said it will ship the 486 in volume in 1989.

CONFLICTING ANNOUNCEMENTS. The events that triggered the

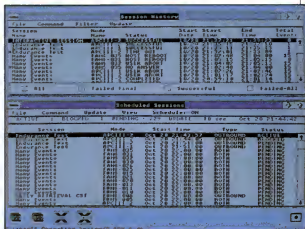
You can install OS/2 into your existing DOS or OS/2 1.0 directory structure, or you can reformat your disk (backing up first). Unlike OS/2 1.0, it lets you use a single large directory, rather than limiting you to 32 megabytes, so you may want to reformat your disk. OS/2 1.1 and the various utilities that come with it take up about 8.2 megabytes of disk space.

The operating environment sets up a default configuration, which you can then view, change, or simply accept. Most of the defaults are good, but if you need to change them, you only need to fill in a configuration screen.

This controls such options as the number of buffers, the size of the disk cache, the number of buffers in the environment, support, the enabling of various memory management features, and setting up the DOS "compatibility box" (which takes some memory). These settings let OS/2 manage program priorities dynamically and set how many seconds an application should wait before receiving a higher priority.

OS/2 1.1 requires a 286- or 386-based machine with at least 2.5 megabytes of free RAM (if you want to run DOS as well as OS/2) and will cost \$100. IBM will offer free upgrades to users of OS/2 1.0, and other vendors are expected to follow.

group's formation occurred six weeks ago when PC buyers were hit with a triple whammy of conflicting announcements. Within one 24-hour period, the Extended Industry Standard Architecture (also known as the "Gang of Nine") coalition announced a 32-bit alternative to IBM's controversial Micro Channel Architecture (MCA). IBM appeared to be going back to the future by introducing two new machines using the "classic" AT bus, and Apple raised prices of its Macintosh systems 15 to 30 percent when it announced "See Winds of Change Spawn Storm of Controversy: Industry Ferment Forces Many PC Buyers Into Holding Pattern," September 19.)



Xcelent! graphics-based system that uses Presentation Manager employs the "point and shoot" method of configuring.

PM

Continued From Page 1

using the mouse. Pop-up and pull-down menus, as well as dialog boxes, also simplify the process of setting up and managing hundreds of remote nodes.

The "point and shoot" method of configuring each part of the network system simplifies and speeds up operator training and setup time, said Dennis Crumpler, Xcelent! president. The system is being tested in several pilot sites, including large retail chains. More pilot sites are planned before the commercial release of the program, which is expected early in the second quarter of 1989.

Borland is also expected to demonstrate a Presentation Manager program, which sources said would ship later this quarter.

INCOMPLETE ENVIRONMENT. While IBM and Microsoft are stressing they have met their goal, programmers report that the development environment is not yet complete.

"Basically, there is no printer support," said Ken Whitaker, vice president of research and development at Software Publishing. In addition, drivers for monitors are not ready, he said.

IBM has developed drivers for its Proprietary and displays,

such as the 8514, but other vendors will have to develop device drivers for non-IBM hardware, according to George Grayson, president of Micrograph. That process could take as long as a year, he added.

Some developers are also frustrated with the quality of the Software Developers' Kit, saying that they need more than a complete operating system and a clean set of tools.

"Even if we have a production copy of Presentation Manager, there are still a few problems," said Terry Zimmerman, vice president of marketing for Personal CAD. Because both the code and documentation are incomplete, tracing where problems occur and solving them can take more time, he added.

"We just have to be as patient as we can with getting the solution," Zimmerman said.

SPEED ISSUES. Presentation Manager's speed is another issue the developers hope Microsoft will work on. "The speed had better be taken care of," said Software Publishing's Whitaker. "Presentation Manager running in protected mode still leaves a lot to be desired," he added.

But other developers are philosophical, saying that performance issues are relative, and much of Presentation Manager is as clean as is possible.

"You have a lot of power [under Presentation Manager] because a lot of the housekeeping you had to deal with under earlier windowing systems, which were limited with the lack of memory, goes away," said Bob Frankston, chief scientist at Lotus.

FUTURE APPLICATIONS. Still, most publishers say it won't take quite some time for Presentation Manager applications to come to market. Although a few early adopters will have products available in late 1988 and early 1989, most companies won't ship Presentation Manager programs which were limited with the second half of 1989.

"Next summer will be a fun time," Frankston said. —Robert Snowdon Jones also contributed to this report.

486

Continued From Page 1

"Stories abound of vendors with imaginative but incompatible products that fell by the wayside," the group's statement reads. "The lesson should be clear: Progressive PC standards create better ease of use for end-users and greater standards while building superior reliability and service into their products."

USER GUIDANCE. Users are the ones who must guide vendors into setting adequate standards, according to the committee, which cautioned, however, that



NOTES FROM THE FIELD ■ BY ROBERT X. CRINGELY

Presentation Manager Tricks Haunt Microsoft

Californians are into Halloween. Maybe it's the proximity of Hollywood, but adults here love to dress in costumes, and ever since the court made me start wearing something under my raincoat, so do I. This year, I'm going to parties as a Hell's Angel, which is not only a cheap costume to put together but also helps me get parking places.

It's a simple costume, though the tattoo hurt a bit. The part I don't

understand is the chain that bikers use to connect themselves to their oversize leather wallets. Are the Hell's Angels plagued by pickpockets? *InfoWorld* readers who are motorcycle gang members, please give me a call on this one.

ENTREPRENEUR'S REWARD. Leaving the house to pick up Pammy, I met a dozen 7-year-old robots accompanied by a tired-looking father assigned to protect them

from razor blades and cyanide Snickers. "Trick-or-treat! We only take money," they squealed in unison.

"Give me the trick," I said. On this mindless repetition theme, how many different versions of Presentation Manager do we need? PM for OS/2 ships today, despite continued problems with spooling graphics. HP is announcing a PM version for Unix tomorrow.

For its Unix, IBM has chosen the Next interface for AIX rather than PM. And don't forget Metaphor — which is the real interface for OS/2 EE, to be made SAA-compliant through the simple method of changing the SAA standard, as Big Blue is occasionally wont to do.

This leaves Microsoft out in the cold. And Redmond cutting a deal with HP for PM on Unix isn't making Microsoft very popular at IBM.

RESTRAINT IS THE POLITICAL PART OF VALOR. There's a sense of power that comes with having people fear you. Driving to Pammy's house, looking like an extra from *The Wild One*, I slipped deeper into my biker role. When I stopped by the 7-Eleven and found the Slurpee machine out of order, I wanted to "bust heads."

But heads remained unbusted, and I had a Diet Coke instead. The chant around Washington is that similar restraint was applied to the Air Force multi-user Unix contract award announcement, originally scheduled for this week. The announcement of one of the largest computer contracts in government history was delayed until after the election, I'm told, so that Dukakis couldn't point to it as wasteful spending.

The folks at Plus Development are also showing some restraint in refusing to tell me about their upcoming Impulse announcement. But I hear the product, code-named BMR, is a drive array using Prodrive AT drives (probably for LANs) that allows the system to handle multiple physical hard disks as a single logical drive. Could this mean the product might also be developed for use in Passport removable drives?

THIS IS WHAT BOB GETS PAID FOR. Tonight's Halloween party was at the home of a sometime friend, who also happens to be an industry big shot. "Come to the party and have a good time, Bob," he told me early this week. "But there are some topics I want you to stay away from, OK?"

"Don't mention that the Dbase IV version shipping today will go out with documentation printed in June that no longer matches features of the program. Don't mention that Symantec will have Q&A for the Mac at Macworld in January. Don't mention that Simon & Schuster Software is essentially out of business. And don't ask why IBM's charging \$340 for OS/2 when it said it would cost \$325 when it was announced last year."

"Anything else you don't want me to ask about?" I wondered.

"Yes, don't ask my wife to dance." Arriving finally at Pammy's house, she came to the door, a vision in black leiker and spiked heels, the perfect biker's woman. "Bobby!" she squealed happily, taking the chain from my wallet. "You brought me a necklace!"

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